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ABSTRACT

These written domain referenced tests (DRTs) for the area of transportation/automotive mechanics test cognitive abilities or knowledge of theory. Introductory materials describe domain referenced testing and test development. Each multiple choice test includes a domain statement, describing the behavior and content of the domain, and a test item pool. These domains are covered: (1) heating and cooling systems, (2) fuel system, (3) body electrical, (4) braking system, (5) engine system, (6) power train system, (7) starting and charging systems, (8) ignition system, (9) suspension and steering systems, and (10) emissions control system. (DRTs for skills and task detailing booklet are available separately as CE 027 746 and CE 027 745.) (YLB)

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STUDENT ASSESSMENT SYSTEM

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TRANSPORTATION/AUTOMOTIVE MECHANICS

DOMAIN REFERENCED TESTS

VOLUME II: THEORY

COMPILED BY

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December, 1980

Division of Vocational Education
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POLICIES AND PROCEDURES FOR THE CENTER

PURPOSE OF THE CENTER

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3. Provide a production and dissemination center for Vocational Education materials.
4. Provide direct experiences in curriculum development and diffusion for advanced graduate students.
5. Enable faculty members to participate in the development and implementation of a variety of curriculum materials.

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Preface

The test items in this volume were adapted from Selected units in automotive mechanics developed by the State Department of Education, Division of Vocational Education, Richmond, Virginia.

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DOMAIN REFERENCED TESTING

Introduction

Domained Referenced Testing (DRT) is a procedure designed to determine, with a great degree of accuracy, where to place a student within a training cycle. It provides a method for the stratified random sampling of items from a universe (domain) of test items. The procedure can be used to develop either cognitive or psychomotor test items. A competent (saturation) level of learning in a specified domain is required in order for a student to exclude specific training from a course of study. Areas of competence can be clearly shown through the use of a DRT instrument. There are two general requirements for the construction of a DRT. First, all items that could possibly appear in the test should be specified in advance. Secondly, the items in a particular test should be selected by random sampling or stratified random sampling from the universe of content.

This description of a DRT differs from both Norm Referenced Testing (NRT) and Criterion Referenced Testing (CRT). The difference between NRT and DRT is the method of selecting items to be included in the test and interpreting scores. Where NRT uses its data for prediction and selection, DRT collects data for determining competency improvement and transfer of learning.

The distinctions between DRT and CRT are not as pronounced. A CRT measures specific competencies, identifies those who have not mastered an objective, identifies the areas of non-mastery and assists in instructional design. CRT appears to assume that a transfer of learning exists. The primary difference is that in a DRT an extensive pool of test items exist which represent the basic characteristics of important parts of the universe of knowledge. DRT uses these items randomly to measure transfer of learning by observing the methods and results that a student conveys while being tested. Transfer of learning is an important part of vocational education. Instructor product bias, availability, and high costs have in many instances led to the student being taught psychomotor and cognitive skills using one brand, make or model of training aids and devices.

It is not the intent of the writers to replace CRT's with DRT's. Criterion referenced testing should be used throughout the training program to evaluate the performance objectives; whereas, domain referenced testing is used to measure the extent of transferable skills, whether or not skills learned are useful, and to achieve curriculum articulation from one institution to another. A domain evaluation requires the teacher to focus on transferable, generalized skills and knowledge rather than rote learning. It does this by measuring a stratified random sample from a universe of knowledge rather than the criteria of a specific objective.

It has been noted that norm referenced testing and criterion referenced testing cannot link mastery learning with transfer of knowledge. To locate this void, a clear theory of measurement and the research and development of domain referenced testing in Vocational Education is proposed. The main idea behind DRT is to assess a student's knowledge and to place that student at a point in a program which is equivalent to the student's mastery level. This would have a three-fold positive effect. (1) The student would be processed through the course and enter the labor market in a minimal amount of time, (2) DRT's would provide an optimum basis for developing an individualized education plan (IEP), for the post secondary handicapped, and (3) would allow a greater number of students, per year, to participate in post secondary education.

Developing Domain Referenced Tests for Cognitive Abilities

Developing a DRT to test cognitive abilities requires basically the same procedure as that used to develop DRTs in the skill area. The domain to be tested should contain a comprehensive set of test items (item pool) for each task from the domain. Each test item should be identified by task and the items should be grouped in a random fashion. A cognitive test referenced to the domain is then fashioned by selecting items randomly.

Although there is no set procedure for determining the number of test items to select from each task, it is generally considered acceptable to select 10 to 20 percent of the test items from the comprehensive set. If a student can respond to 90 percent of the sample items on the test, then it is generally considered that the student can probably correctly respond to 90 percent of the items in the entire test item pool.

In order to have some assurance that the sample items are truly representative of the tasks within the domain, it is important that the items be randomly selected from the item pool. The key to dependability of the results is (1) the stratification of the domain test items by task, and (2) the random selection of the items to be included in the test. An increase in the number of items to be included also increases the dependability of the results. However, when considering whether to expand the number of items in a domain, it is important to keep in mind the concept of DRTs. That is, the test items for a specific test are (1) randomly selected, and (2) kept to a relatively small number (10 to 20 percent of the total). Otherwise, the purpose of developing a DRT will be seriously compromised.

DOMAIN I

DOMAIN I: Heating and Cooling Systems

Test Item Pool

Domain Statement: Diagnose present and potential problems in the heating and cooling systems of liquid cooled engines. Test, remove, repair and replace the faulty components.

1. Which of the following is an INCORRECT method of inspecting a radiator pressure cap?

   a. Check the cap seal in the filler neck for deposits of foreign matter
   b. Check the rubber seal on the cap to see if it is hard and swollen
   c. Compress the coil spring to force the cap seal onto the radiator filler neck
   d. Check the circulation of the entire system
   e. All of the above

2. Present-day cooling systems are pressurized to

   a. allow limited circulation.
   b. force more coolant through the engine.
   c. raise the boiling point of the coolant to permit higher engine operating temperatures.
   d. reduce the amount of coolant required in the system.
   e. All of the above

3. When checking the coolant level in a pressurized system, automotive manufacturers warn against all EXCEPT which of the following?

   a. Frequent removal of the radiator cap while the engine is warm
   b. Removal of the cap when the engine is hot
   c. Removal of the cap when the engine is running
   d. Adding cold coolant to a system when it is excessively hot
   e. Removal of the cap when the engine is cool

4. When testing the "freeze-protection" of the coolant with a hydrometer, the

   a. engine may be running.
   b. engine and coolant must be cold.
   c. engine and coolant must be hot.
   d. engine and coolant may be either hot or cold.
   e. All of the above

5. Most car manufacturers recommend the year-round use of a coolant solution consisting of

   a. methyl alcohol.
   b. plain water.
   c. alcohol and water.
   d. ethylene glycol and water.
   e. Any of the above

6. A defective thermostat stuck in the open position should be replaced because

   a. it will not allow an engine to warm up properly.
   b. it will not allow the coolant to circulate.
   c. it will cause the engine to overheat.
   d. it will cause the engine to boil.
   e. None of the above

7. When reverse-flushing an engine block,

   a. it is necessary to remove the thermostat.
   b. it is necessary to remove water pump.
   c. the air pressure should be applied in short spurts.
   d. it is necessary to operate the engine at 1500 RPM.
   e. All of the above

8. Engine overheating can be caused by

   a. adding more coolant to the system from time to time.
   b. late ignition timing.
   c. the thermostat being stuck in the open position.
   d. the manifold heat control valve being stuck in the open position.
   e. All of the above

9. The BEST procedure to clean the cooling system properly is the

   a. removal and disassembly method.
   b. chemical method, if either a slight rust or an oil film is found.
   c. chemical method, if heavy deposits of rust and scale are found.
   d. reverse flush method, if an oil film is found.
   e. None of these

10. Slow engine warm-up may be a cooling system difficulty which can be caused by

   a. a defective cooling system thermostat.
   b. a defective by-pass hose.
   c. a defective water jacket.
   d. the cylinder head bolts needing to be tightened.
   e. using too much anti-freeze.

11. Fan, generator and power steering belts should always be replaced

    a. at every engine tune-up.
    b. when frayed, cracked, worn or greasy.
    c. when cleaning the cooling system.
    d. at the same time, even if they are not matched belts.
    e. All of the above

12. Partial coolant circulation in the engine block when the engine is cold is provided by the

    a. manifold heat control valve.
    b. fan.
    c. thermostat.
    d. by-pass
    e. water pump.

13. Compression leakage into the cooling system is caused by

    a. a leaky water pump.
    b. loose hose clamps.
    c. a cracked radiator hose.
    d. a defective head gasket.

14. When using the cooling-system pressure tester, apply a pressure of

    a. 5 P.S.I.
    b. 24 P.S.I.
    c. 15 P.S.I.
    d. 10 P.S.I.
    e. Any of the above

15. Which of the following is at fault when the water pump suddenly starts to leak?

    a. Drain hold
    b. Impeller
    c. Shaft bearing race
    d. Shaft seal
    e. Pump shaft

16. The major components of the engine cooling system are the water pump, engine water jackets, the engine fan and

    a. the thermostat and the crankcase.
    b. the thermostat and the radiator.
    c. the manifolds and the thermostat.
    d. the thermostat and the crankshaft.

17. The major components of an air cooling system are the cooling air control valve, finned metal heat sinks amd the

    a. thermostat.
    b. hoses.
    c. radiator.
    d. exhaust ducts.
    e. All of the above

18. Why are safety glasses desirable when working on an automobile?

    a. To help see more clearly
    b. To prevent eye strain
    c. To prevent eye injury
    d. All of the above

19. When returning INCORRECT parts to an automotive supply store for credit, it is also necessary to take

    a. the purchaser's copy of the bill.
    b. all the old parts.
    c. the vehicle for which the parts are needed.
    d. information concerning the year of the vehicle.
    e. All of the above.

For items 20-25, determine whether the cooling system components desplayed by your instructor are usable or need to be replaced. If usable, mark "U"; if not usable, mark "N".

20. Silicon hub fan drive

21. Water pump

22. Thermostat

23. Fan belt

24. Radiator hose (upper or lower)

25. Radiator assembly

26. If the needle of the pressure tester fluctuates with the engine running at half throttle, chances are there is

    a. an air leak into the cooling system
    b. a cracked engine block.
    c. a defective head gasket.
    d. All of the above

27. If air is sucked into the cooling system,

    a. the water will foam and overflow.
    b. corrosion will result.
    c. the cylinder head gasket should be replaced.
    d. all of the above.

28. Checking for compression leakage into the cooling system requires:

    a. removal of the thermostat and cylinder head.
    b. removal of the thermostat and fan belt.
    c. a pressure tester.
    d. all of the above

29. If the engine radiator freezes,

    a. overheating cannot occur.
    b. overheating may occur.
    c. cooling will not be affected.
    d. none of the above.

30. Most water pumps have:

    a. ball bearings that require periodic lubrication.
    b. sealed ball bearings that require no lubrication.
    c. a relief valve that requires periodic replacement.
    d. all of the above.

31. A cooling system thermostat designated as a 180° F. unit will:

    a. start to open at 177° to 182° F.
    b. be fully open at 177° to 182° F.
    c. start to open at 160° F.
    d. all of the above.

32. With permanent or glycol antifreeze, it is necessary to:

    a. use a 160° F. thermostat.
    b. not use a thermostat.
    c. use a 180° to 200° thermostat.
    d. all of the above.

33. If a pressure cap produces 15 pounds of pressure in a cooling system, then the boiling point of the water will be raised to:

    a. 215° F.
    b. 230° F.
    c. 250° F.
    d. 260° F.

34. Radiators can be classified as:

    a. side flow and flow through.
    b. up flow and down flow.
    c. down flow and cross flow.
    d. all of the above.

35. The water from the engine's water jackets

    a. goes through the pump to the radiator.
    b. moves up through the radiator.
    c. moves down through the radiator.
    d. All of the above

36. The purpose of the variable speed fan drive is to

    a. improve cooling efficiency at high speeds.
    b. reduce power requirements at low speeds.
    c. reduce power requirements at medium and high speeds.
    d. All of the above

37. If a vehicle is overheating, it is necessary to first check the

    a. thermostat operation.
    b. water pump output.
    c. radiator pressure cap.
    d. fan belt adjustment.
    e. level of coolant.
    f. All of the above

38. A pressure cap is used on the radiator in most automotive cooling systems to

    a. prevent the loss of coolant through overflow if the vehicle is brought to a quick stop.
    b. keep air out of the cooling system at all times.
    c. raise the boiling point of the coolant.
    d. maintain a constant operating temperature.

39. The by-pass valve in the cooling system prevents

    a. pressure buildup in the radiator.
    b. fast warm up of the engine block.
    c. the top radiator hose from blowing off.
    d. pressure buildup in cylinder block until the thermostat opens.
    e. pressure buildup in the heater core.

40. The thermostat on an emission controlled engine would MORE likely be wide open after prolonged

    a. idling in traffic.
    b. driving at sustained highway speeds.
    c. engine operation at high RPM.
    d. All of the above

41. The MOST critical heat transfer limiting point of a liquid cooling system is between the

    a. block and the coolant.
    b. head and the coolant.
    c. coolant and the radiator.
    d. radiator and the air.
    e. All of the above

42. When the thermostat is closed, coolant will always flow through the

    a. radiator.
    b. heater core.
    c. by-pass.
    d. atmospheric valve.
    e. All of the above

43. A water pump seal may leak

    a. air.
    b. water.
    d. oil.
    e. All of the above

44. Under pressure, water boils at a

    a. higher temperature.
    b. lower temperature.
    d. All of the above
    e. None of the above

45. In addition to providing greater capacity, what is the purpose of an auxiliary tank?

    a. To provide transmission cooling
    b. To act as an expansion chamber
    c. To connect the engine to the radiator
    d. All of the above

46. How much of the heat energy in the fuel must be handled by the cooling system?

    a. One-half
    b. One-third
    c. One-fourth

47. The water pump is driven from the

    a. camshaft.
    b. engine fan.
    c. crankshaft timing gear.
    d. crankshaft pulley.

48. The types of anti-freeze are alcohol base and

   a. heptane.
   b. ethylene glycol.
   c. tetraethyl.
   d. octane.

49. The MOST important function of automobile ventilation systems is to

   a. increase the resale value of the automobile.
   b. provide clean air for the occupants.
   c. improve safety by having less driver fatigue.
   d. permit operation of the automobile under all climatic conditions.

50. Heat may be transferred by

   a. radiation.
   b. convection.
   c. conduction.
   d. All of the above

51. Essentially, the process of cooling means

   a. evaporation.
   b. removal of heat.
   c. melting.
   d. removal of moisture.

52. As the pressure on a liquid is lowered, the boiling point is

   a. raised.
   b. held steady.
   c. lowered.
   d. None of the above

53. "B.T.U." refers to the amount of heat required to

   a. raise the temperature of 1 pound of water 1 degree Fahrenheit.
   b. cool the temperature of 1 gram of water 1 degree Fahrenheit.
   c. raise the temperature of 1 gram of water 1 degree Fahrenheit.
   d. raise the temperature of 1 ounce of water 1 degree Fahrenheit.

54. The MOST probable cause for a heater to blow cold air is that the

   a. heater hoses have collapsed.
   b. thermostat is stuck open.
   c. radiator pressure cap is not working properly.
   d. window vents are not closed.

55. Heater controls are operated by

   a. vacuum and pressure.
   b. pressure and cables.
   c. cables only.
   d. vacuum and cables.

56. When a liquid changes to a vapor the heat transfer involved is called

a. vaporization heat.
b. latent heat.
c. condensation heat.
d. heat of fusion.

57. The temperature of the coolant passing through the heater core is controlled by the

a. radiator size.
b. heater core capacity.
c. coolant temperature in the radiator.
d. the thermostat operating range.

58. Heater motors are MOST often

a. connected in series circuit with the ignition switch.
b. connected in paralled circuit with the ignition switch.
c. in a separate electrical circuit.
d. None of the above

59. Which of the following is NOT true concerning a defective thermostat? It causes the:

a. engine to run too cool.
b. engine to run too hot.
c. engine not to run at all.
d. engine to use too much gas.

60. The heat exchanger often found in the bottom of a radiator is used to cool the:

a. power steering fluid.
b. disc brake fluid.
c. automatic transmission fluid.
d. refrigerant in the air conditioner.

61. Conventional water pumps are examples of which of the following designs?

a. plunger
b. gear
c. impeller
d. vane

62. Anti-freeze testers have more than one scale. Which statement BEST describes why this is necessary?

a. to allow for the temperature of fluid tested.
b. to read different mixtures of anti-freeze.
c. to use the tester as a hydrometer for testing batteries.
d. to allow for the air temperature at the time of testing.

63. Which statement LEAST describes why a cooling system is pressure-tested?

    a. to see if the pressure cap will hold the designated pounds of pressure.
    b. to see if the system will hold the designated pounds of pressure.
    c. to see if the system is clogged with rust.
    d. to see if the head gasket is leaking water.

64. What is the MAIN purpose of the water pump by-pass hose?

    a. to relieve excessive pressure on the engine during high speed driving.
    b. to insure the circulation of coolant when the thermostat is closed.
    c. to prevent an air pocket in the water pump housing.
    d. to prevent the collapse of the lower hose due to the water pump creating a vacuum.

65. Water in a sealed container under ten pounds of pressure will not boil until it reaches:

    a. 212 degrees
    b. 222 degrees
    c. 232 degrees
    d. 242 degrees

66. Radiator caps have several purposes. Which of the following is NOT one of them?

    a. to keep the radiator from leaking (due to pressure control)
    b. to control the pressure to a predetermined level.
    c. to control the vacuum within the system.
    d. to allow the water to get hotter than 212° without boiling.

67. Heat may be transferred from one medium to another by:

    a. radiation.
    b. convection.
    c. conduction.
    d. all of the above.
    e. none of the above.

DOMAIN II: Fuel Systems

Test Item Pool

Domain Statement: Diagnose present and potential fuel system malfunctions and test, remove, repair and replace faulty components.

1. With an automatic choke, the position of the choke valve is determined by the:

   a. thermostatic spring and vacuum position.
   b. magnetic spring and pump piston.
   c. spring and pressure piston.
   d. throttle cracker.
   e. metering rod.

2. The manifold heat control device is designed to:

   a. control exhaust manifold temperatures.
   b. promote fuel vaporization during engine warm up.
   c. shorten engine warm up time.
   d. assure operation of the automatic choke.
   e. eliminate the problem of fuel vapor lock.

3. Generally with an engine idling at 500 r.p.m., the fuel pump pressure should be:

   a. 1 to 2 p.s.i.
   b. 10 to 12 p.s.i.
   c. 8 to 10 p.s.i.
   d. 4 to 6 p.s.i.
   e. 15 to 20 p.s.i.

4. When testing a fuel pump, immediately after the engine is stopped, the pump pressure should:

   a. remain constant or slowly fall.
   b. fall off rapidly.
   c. rapidly fluctuate.
   d. immediately fall to zero pressure.
   e. increase slowly to atmospheric pressure.

5. A fuel level in a carburetor which is lower than specified will result in:

   a. crankcase dilution.
   b. loss of power.
   c. poor gas mileage.
   d. spark plug fouling.
   e. excessive idle speed.

6. The fuel level in a carburetor can be set by adjusting the:

   a. balance tube.
   b. pump operating level.
   c. inlet check valve.
   d. dashpot plunger.
   e. float arm.

7. The condition that would MOST likely be the cause of an excessive amount of fuel being delivered to the engine is:

   a. A fuel pump diaphragm spring which is too strong.
   b. A kinked fuel line.
   c. A carburetor float valve which is stuck.
   d. A loose fuel pump.
   e. A stretched fuel pump diaphragm.

8. When comparing the controlled combustion system (C.C.S.) with earlier exhaust emission systems, in general, the C.C.S. system uses a :

   a. richer carburetor setting, advanced timing, hotter running engine.
   b. leaner carburetor setting, advanced timing, hotter running engine.
   c. leaner carburetor setting, retarded timing, colder running engine.
   d. richer carburetor setting, retarded timing, colder running engine.
   e. leaner carburetor setting, retarded timing, hotter running engine.

9. The air injection emission control system eliminates much of the exhaust emissions by:

   a. forcing exhaust gases through a pump which reburns the gases.
   b. returning unburned exhaust gases to the carburetor and reburning the gases.
   c. pumping oxygen to unburned exhaust gases which reburns the gases.
   d. increasing exhaust pressure which reignites the gases.
   e. rapidly cooling the exhaust gases which removes the hydrocarbons.

10. The anti-backfire valve of an air injection system of emission control has the:

    a. inlet connected to the air pump and the outlet connected to the intake manifold.
    b. inlet connected to the intake manifold and the outlet to the exhaust manifold.
    c. inlet connected to the check valve and the outlet to the exhaust manifold.
    d. inlet connected to the intake manifold and the outlet to the air pump.
    e. inlet connected to the exhaust manifold and the outlet to the carburetor.

11. The most probable cause of backfiring in the exhaust in an air injection emission control system would be:

    a. a leaking relief valve.
    b. a check valve which is stuck open.
    c. a loose hose connection.
    d. a clogged air cleaner.
    e. an inoperative air pump.

12. In general, emission control systems which do not use an air pump are designed to minimize unburned gasoline in the exhaust by:

    a. controlling carburetion and ignition at all speeds.
    b. diverting unburned gases through a by-pass valve.
    c. reburning gases in the exhaust system.
    d. reburning gases in the combustion chamber.
    e. removing unburned gases through the injection tube.

13. The combustion efficiency analyzer is used

    a. before the engine reaches normal operating temperature.
    b. to analyze oil consumption.
    c. only when the engine is in good condition.
    d. to determine incorrect ignition timing.
    e. to determine the condition of the exhaust system.

14. The most probable cause of an overheated exhaust system would be:

    a. advanced ignition timing.
    b. a leaking fuel line.
    c. a leaking exhaust manifold.
    d. retarded ignition timing.
    e. a manifold heat control valve which is stuck open.

15. When comparing the positive crankcase ventilation system with the road draft tube system of removing crankcase emissions, which statement is not correct? The P.C.U system provides:

    a. greater fuel economy at low speeds.
    b. less fuel economy at idle speed.
    c. greater fuel economy at normal operating speeds.
    d. longer engine life.
    e. less air pollution.

16. The positive crankcase ventilation system (P.C.V.) uses a

    a. vacuum supply from the intake manifold.
    b. vacuum supply from the exhaust manifold.
    c. pressure supply from the intake manifold.
    d. pressure supply from the exhaust manifold.
    e. vacuum supply from the road draft tube.

17. The most likely cause of difficulty in starting an engine in cold weather would be:

    a. vapor lock.
    b. a stuck heat control valve.
    c. gasoline which is not sufficiently volatile.
    d. gasoline which is too volatile.
    e. a carburetor float level which is too high.

18. The most likely cause of excessive fuel consumption would be:

    a. a clogged air cleaner.
    b. a low carburetor float setting.
    c. low fuel pressure.
    d. a clogged bowl vent.
    e. a carburetor float valve which is stuck shut.

19. The MOST likely cause of fuel tank and inlet line collapse would be:

    a. a low fuel level.
    b. vapor lock.
    c. an air leak.
    d. a clogged bowl vent.
    e. a clogged tank filter.

20. Regarding knocking in the combustion chamber, which statement is not true?

    a. Too rapid a rate of flame propagation causes knocking.
    b. Too slow a rate of flame propagation causes knocking.
    c. High octane gasoline is less apt to cause knocking.
    d. tetraethyllead added to gasoline reduces knocking.
    e. high compression engines require gasoline with a slower rate of propagation.

21. The anti-percolator device in a carburetor

    a. aids cold weather starting.
    b. increases the air-fuel ratio.
    c. allows fuel vapors to be vented.
    d. operates in conjunction with the float system.
    e. is operated by a metering rod.

22. The most likely cause of combustion knock would be:

    a. overly high octane gasoline.
    b. excessive fuel pressure.
    c. a lean fuel mixture.
    d. inadequate fuel pressure.
    e. a rich fuel mixture.

23. Vapor lock in a fuel system can be caused by:

    a. a clogged fuel pump filter.
    b. fuel lines which are too close to the exhaust manifold.
    c. a defective vacuum pump diaphragm.
    d. inadequate fuel pump pressure.
    e. excessive fuel pump pressure.

24. When adjusting the carburetor, set the slow idle R.P.M.:

    a. before the engine reaches normal operating temperature.
    b. with the throttle valves open.
    c. with the choke partially open.
    d. with the choke fully open.
    e. with an automatic transmission always in drive.

25. The condition that would least likely be the cause of no fuel being delivered to the engine is:

    a. a clogged fuel line.
    b. an inoperative fuel pump.
    c. a partially clogged tank vent.
    d. a carburetor float valve stuck shut.
    e. a vapor lock.

26. The condition that would least likely be the cause of insufficient fuel being delivered to the engine is:

    a. a cracked fuel pump diaphragm.
    b. an overly thick gasket between the fuel pump and block.
    c. a weak fuel pump spring.
    d. a fuel pump diaphragm which is over-tensioned.
    e. an air leak between the tank and pump.

27. The MOST likely cause of poor acceleration would be:

    a. an over-tensioned fuel pump diaphragm.
    b. a ruptured accelerator pump diaphragm.
    c. a sticking P.C.V. valve.
    d. a carburetor main jet which is oversize.
    e. a sticking fast idle cam.

28. The MOST likely cause of carburetor flooding would be:

    a. a float valve which is stuck shut.
    b. deficient fuel pressure.
    c. worn fuel pump check valves.
    d. a carburetor float level which is too high.
    e. a carburetor float level which is too low.

29. On a combination fuel vacuum booster pump, a defective booster pump can cause

    a. excessive fuel consumption.
    b. a pressure buildup in the fuel line.
    c. a vapor lock in the fuel line.
    d. gasoline leakage.
    e. heavy oil consumption.

30. When adjusting the carburetor, the engine is running at the proper fast idle R.P.M. when:

    a. the idle screw contacts the bottom of the idle cam.
    b. the throttle valves are closed.
    c. the choke valve is partially open.
    d. the choke valve is closed.
    e. the choke valve is completely open.

31. Fuel-air mixtures are measured in

    a. cubic feet.
    b. pounds.
    c. square feet.
    d. cubic tons.

32. A carburetor, in its simplest form, may be referred to as a (n)

    a. proportioner.
    b. mixing valve.
    c. mixer.
    d. atomizer.

33. The octane rating of gasoline refers to its

    a. volatility.
    b. anti-knock properties.
    c. heat release.
    d. evaporation point.

34. When one gallon of gasoline is burned in an engine, how many gallons of water are produced?

    a. 1/2 gallon
    b. 1 gallon
    c. 1 1/2 gallons
    d. 2 gallons

35. Before gasoline will burn properly, it must be

    a. atomized and dried.
    b. atomized and compressed.
    c. atomized and ignited.
    d. atomized and mixed.

36. The fuel system delivers the fuel-air mixture FIRST to the

    a. intake manifold.
    b. engine.
    c. combustion chamber.
    d. valves.

37. The fuel pump has

    a. one check valve.
    b. two check valves.
    c. three check valves.
    d. four check valves.

38. The fuel pump pressure is determined by the

    a. diaphragm
    b. diaphragm spring.
    c. actuating arm.
    d. check valves.

39. Dirt in the fuel system will cause excess wear to the fuel pump's

    a. diaphragm.
    b. actuating link pivot.
    c. diaphragm spring.
    d. check valves.

40. Which of the following is NOT used by car manufacturers for gasoline lines?

    a. Copper
    b. Steel
    c. Neoprene rubber
    d. Plastic

41. How many basic systems does the carburetor have?

    a. Four
    b. Six
    c. Eight
    d. Ten

42. The venturi is located in the

    a. fuel tank.
    b. fuel pump.
    c. carburetor.
    d. intake manifold.

43. The narrow, or constricted, air flow region in a carburetor increases the

    a. pressure.
    b. vacuum draw.
    c. spring pressure.
    d. float setting.

44. What carburetor system is in use while a vehicle is crusiing at 50 M.P.H.?

    a. Idle/low speed
    b. Power
    c. Choke
    d. Main metering

45. The ideal air-fuel ratio for normal engine operation is

    a. 11 to 1.
    b. 13 to 1.
    c. 15 to 1.
    d. 19 to 1.

46. Depressing the accelerator pedal opens the

    a. idle jet.
    b. pump jets.
    c. gas valve.
    d. throttle valve.

47. Carburetor flooding is MOST often caused by

    a. dirt between the needle and the seat.
    b. a hole in the float.
    c. a too high float level.
    d. a bent float pivot pin.

48. A carburetor float that is set too high will cause

    a. an overrich mixture.
    b. a lean mixture.
    c. a power increase.
    d. better gas mileage.

49. In the cold weather, the accelerating system pump stroke should be

    a. disconnected.
    b. increased.
    c. bent.
    d. decreased.

50. If the high-speed nozzle is discharging gasoline with the engine idling, chances are that

   a. the carburetor is functioning properly.
   b. the float level is too high.
   c. the choke valve is jammed open.
   d. there is no current going to the anti-dieseling solenoid.

51. If the engine runs roughly through the idling to 25 M.P.H. range, chances are that the

   a. idle/low-speed circuit is not functioning properly.
   b. low-speed circuit is not functioning properly.
   c. high speed circuit is not functioning properly.
   d. idle circuit is not functioning properly.

52. To clean the paper air-cleaner element,

   a. wash it with kerosene.
   b. use compressed air.
   c. wash it with light engine oil.
   d. wash it with gasoline.

53. To clean the polyurethane air-cleaner element,

   a. wash it with acetone.
   b. use compressed air.
   c. wash it with oil.
   d. wash it with varsol.

54. Before installing the polyurethane air-cleaner element,

   a. make sure it is dry.
   b. dip it in engine oil and shake out the excess.
   c. dip it in engine oil and squeeze out the excess.

55. Possible causes of insufficient fuel delivery to the carburetor are

   a. a cracked diaphragm and excessive spring pressure.
   b. a cracked diaphragm and a sticking pump valve.
   c. an excessive bearing clearance and a worn pump rotor.

56. A high carburetor float level, worn jets, or a rich idle mixture can cause

   a. loss of power at high speeds.
   b. excessive fuel consumption.
   c. engine stalling after high-speed driving.
   d. None of the above

57. Lack of high speed engine performance could be caused by a

    a. stuck power piston, a clogged nozzle, or a low float level.
    b. choke valve jammed open, a clogged nozzle, or a high float level.
    c. worn nozzle, air leaks into the manifold, or high pump pressure.

58. A smoky, black, sooty exhaust is MOST likely due to

    a. a blown head gasket.
    b. excessive oil consumption.
    c. a worn piston.
    d. an excessively rich fuel-air mixture.

59. Failure of the engine to start unless primed is probably caused by trouble in the

    a. ignition system.
    b. starting system.
    c. lubricating system.
    d. carburetor.

60. One cause of engine stalling during warm up is the

    a. choke valve is not closing.
    b. choke valve is not opening.
    c. power valve is not opening.

61. Typical carburetor adjustments that can be made on a car include

    a. idle speed and high speed.
    b. pump pressure and choke.
    c. idle mixture and choke.
    d. choke and power.

62. To clean carburetor jets and circuits PROPERLY, use

    a. a solvent and compressed air.
    b. wire and compressed air.
    c. drills and solvent.
    d. wires and drills.

63. When servicing the carburetor,

    a. oil the automatic choke.
    b. replace the automatic choke.
    c. do not oil the automatic choke.

64. The damper in the thermostatically controlled air cleaner should start to open at a temperature between

    a. 20° and 40° F.
    b. 65° and 90° F.
    c. 85° and 115° F.
    d. 120° and 145° F.

65. The temperature of the burning fuel in an automobile engine is approximately:

   a. 850 degrees.
   b. 1000 degrees.
   c. 4500 degrees.
   d. the temperature cannot be determined.

66. Which of the following is NOT a part of the starting, charging or ignition systems?

   a. sending unit.
   b. battery.
   c. coil.
   d. regulator.

67. The rotor, stator and end frame assemblies are component parts of:

   a. an electronic control unit.
   b. a regulator.
   c. a rectifier.
   d. an alternator.

68. Which one of the following would be the MOST important reason for immediately cleaning up gasoline that is spilled on the engine or floor when making a fuel pump test?

   a. shop neatness.
   b. fall prevention.
   c. engine harm and floor paint damage.
   d. fire prevention.

69. To prevent the engine from starting when cranking for a fuel pump test, it is necessary to remove and ground the:

   a. high tension coil wire.
   b. spark plug wires.
   c. battery ground cable.
   d. ignition switch lead.
   e. number one plug wire.

70. To check a fuel pump which is not supplying the proper amount of gas to the carburetor, which of the following gauges should be used?

   a. feeler gauge.
   b. pressure gauge.
   c. compression gauge.
   d. plastigage.
   e. dial gauge.

71. When servicing fuel filters, which one of the following types can be cleaned?

    a. fine screen.
    b. ceramic.
    c. treated paper.
    d. sintered bronze.

72. To make carburetor adjustment for a fuel level that is too high, adjust the:

    a. float.
    b. fuel intake valve.
    c. discharge nozzle.
    d. fuel pump pressure valve.

73. Which of the following applies to fuel pump testing?

    a. compression.
    b. pressure.
    c. valve.
    d. diaphragm.

74. Which of the following is NOT a carburetor circuit?

    a. float circuit.
    b. vacuum kick-back circuit.
    c. choke circuit.
    d. idle and low speed circuit.
    e. high speed, part-load circuit.

75. Which of the following is NOT a part of the fuel supply system?

    a. fuel pump.
    b. fuel tank.
    c. fuel gauge.
    d. carburetor
    e. intake manifold.

76. Which of the following would be an ideal air-fuel ratio for normal engine cruising operation?

    a. 8 to 1
    b. 12 to 1
    c. 15 to 1
    d. 19 to 1

77. How should a paper air filter element be cleaned?

    a. by washing it in a cleaning solvent.
    b. by blowing it out with compressed air.
    c. by washing it in gasoline.
    d. by using a vacuum cleaner.
    e. by tapping it against some hard surface.

DOMAIN III: Body Electrical

Test Item Pool

Domain Statement: Diagnose and repair body electrical malfunctions including testing and rewiring or replacing components.

1. When measuring the amperage in a circuit, the ammeter is connected:

    a. in parallel with the load.
    b. in series with the load.
    c. across the load.
    d. from the battery lead to ground.
    e. a and d.

2. In a fused circuit, the fuse will blow if it is subjected to:

    a. excessive voltage.
    b. varying voltage due to a poor connection.
    c. excessive amperage.
    d. varying amperage due to a poor connection.
    e. all of these.

3. Ohm's law simply stated is AXO=V. If a relay coil takes .6 amps to operate on 12 volts, how much resistance does it have?

    a. 2 OHMs
    b. .2 OHMs
    c. 7.2 OHMs
    d. .72 OHMs
    e. 20 OHMs

4. To check the voltage at the horn, connect a voltmeter across:

    a. two horn terminals.
    b. live horn terminal and ground.
    c. between horn and relay circuits.
    d. the horn button.
    e. the voltage source.

5. To find the total amount of resistance in a series circuit, the value of all resistances should be:

    a. subtracted from total voltage.
    b. less than the lowest.
    c. added together.
    d. divided by the total number of resistances.
    e. divided by two and added together.

6. The headlight circuit consisting of the battery, light switch, dimmer switch, headlights, and ground return is a:

   a. parallel circuit.
   b. series-parallel circuit.
   c. series circuit.
   d. short circuit.
   e. closed circuit.

7. In a 12 volt system, a light bulb of .5 ohms resistance will require a fuse of (Formula V = AXO):

   a. 30 amps.
   b. 20 amps.
   c. 10 amps.
   d. 6.0 amps.
   e. .6 amps.

8. If one beam is out on one headlight, best procedure would be to:

   a. test headlight with OHM meter.
   b. check voltage at light.
   c. check voltage at headlight switch.
   d. check voltage at dimmer switch.
   e. a and b.

9. Test condition: No lights, starter does not turn, probable cause:

   a. weak battery
   b. grounded armature.
   c. open circuit, switch to solenoid.
   d. open circuit at battery.
   e. open circuit solenoid to starter.

10. Which of the following connects and disconnects the battery from the primary circuit?

    a. ignition coil
    b. voltage reducer
    c. rotor button
    d. ignition switch

11. If an engine will start, but fails to continue running when the key is released, which of the following may be defective?

    a. ignition by-pass wire
    b. ignition coil
    c. ballast resistor
    d. primary wire
    e. secondary coil wire

12. When working on the electrical system, which of the following rules should be observed?

    a. gloves should be worn
    b. the floor should be dry and insulated
    c. all power should be cut off
    d. rings should not be worn

13. If the battery booster cables are NOT properly hooked on a car equipped with an alternator, which of the following would be damaged?

    a. stator
    b. rotor
    c. field terminal
    d. diodes

14. When connecting an ammeter in a circuit, it would be connected in which of the following manners?

    a. parallel
    b. across
    c. series
    d. all of the above

15. The negative post of a battery can be identified because

    a. it is the larger post
    b. it is painted red
    c. it has a + sign stamped on the post
    d. it is the smaller post

16. A battery with a specific gravity of 1.290 can be considered

    a. discharged
    b. half-charged
    c. fully-charged
    d. shorted out

17. The device used to make the specific gravity test is called

    a. a thermometer
    b. a hydrometer
    c. a voltmeter
    d. an ammeter

18. A battery produces electricity as a result of

    a. current flow
    b. chemical change
    c. resistance change
    d. induction

19. Which of the following statements is NOT correct?
    a. for safety's sake, remove the battery ground cable first
    b. a battery gassing while charging can explode
    c. electrolyte will damage many materials
    d. the best substance for removing spilled electrolyte is soap and water

20. Temperature must be considered when using a battery hydrometer. Which of the following scales indicates a PROPER conversion allowance?
    a. .008 for 10 degrees.
    b. .010 for 8 degrees.
    c. .001 for 1 degree.
    d. .004 for 10 degrees.

21. Voltmeters are usually connected when testing a circuit in which of the following ways?
    a. parallel
    b. series-parallel
    c. series
    d. none of the above

22. Ammeters are usually connected when testing a circuit in which of the following ways?
    a. parallel
    b. series-parallel
    c. series
    d. all of the above
    e. none of the above

23. Voltage means
    a. electrical pressure
    b. electrical resistance
    c. current flow
    d. electrical quality

24. The term amperage refers to
    a. electrical pressure
    b. electrical resistance
    c. current flow
    d. none of the above

25. Electrical resistance is measured in
    a. volts
    b. E.M.F.
    c. amperes
    d. ohms

26. Which sequence is PROPER for setting up a battery charger?

   a. Do not remove the cables for the alternator wire. Remove caps, fill with water. Hook the leads and charge battery. Unhook charger and replace caps.

   b. Remove the cables. Do not remove the alternator wire. Remove caps. Hook leads and charge battery. Fill with water.

   c. Remove the cables. Remove the caps, fill with water. Take hydrometer reading. Connect leads and charge battery. Remove leads and install caps.

   d. Hook up charging leads. Remove caps, fill with water. Take hydrometer reading. Install acid as needed. Remove leads and install caps.

DOMAIN IV: Braking System

Test Item Pool

Domain Statement: Diagnose present and potential brake failure. Inspect, test, remove, overhaul and replace brake system components.

1. If the master cylinder compensating port remains closed when the brake pedal is released, it can cause:

   a. a pressure buildup in the lines.
   b. air to be introduced into the system.
   c. the brake pedal to gradually drop.
   d. a pressure release in the lines.
   e. unequal pressure in different parts of the system.

2. In reference to the diameter sizes of front and rear wheel cylinders, which statement is generally true?

   a. The front and rear are the same in order to assure equal pressure.
   b. The front is larger in order to compensate for additional weight when braking.
   c. The rear is larger in order to compensate for pressure loss due to greater distance from master cylinder.
   d. The rear is larger in order to increase the rate of return of fluid to the master cylinder.
   e. Pressure is directly proportional to distance; therefore, the rear is larger in order to equalize pressure:

3. A car pulls to one side when braking. The condition which would least likely be the cause is:

   a. air in the system.
   b. clogged brake line.
   c. mismatched linings.
   d. loose brake backing plates.
   e. defective wheel bearings.

4. Generally when bleeding the brake system, first bleed the wheel cylinder:

   a. on the right rear wheel.
   b. nearest the master cylinder.
   c. farthest from the master cylinder.
   d. on either rear wheel.
   e. on either front wheel.

5. When replacing brake lines, use:

   a. double-wrapped copper tubing.
   b. single-walled stainless steel tubing.
   c. double-wrapped, coated steel tubing.
   d. double-wrapped, coated brass tubing.
   e. coated stainless steel tubing.

6. Residual pressure in the brake lines is maintained by the:

   a. master cylinder compensating port.
   b. proportioning valve.
   c. master cylinder check valve.
   d. master cylinder breather port.
   e. master cylinder stop plate.

7. When the diameter of a hydraulically operated piston is increased, the:

   a. pressure per square inch is increased.
   b. pressure per square inch is decreased.
   c. pressure per square inch remains the same.
   d. total pressure is decreased.
   e. total pressure remains the same.

8. With the integral type power brake system, the diaphragm acts directly on the hydraulic piston in the:

   a. compressor cylinder.
   b. wheel cylinders.
   c. multiplier unit.
   d. atmosphere chamber.
   e. master cylinder.

9. In an assist power-brake system, when the brake pedal is depressed:

   a. the hydraulic pressure is increased which actuates a control valve in the bellows.
   b. a control valve in the power-brake assembly admits atmospheric pressure to the diaphragm.
   c. a control valve in the power-brake assembly admits atmospheric pressure to the bellows.
   d. a valve in the power-brake assembly admits vacuum into the bellows.
   e. a valve in the power-brake assembly admits atmospheric pressure to the bellows.

10. With the vacuum-suspended power brake system, the brakes are applied when:

    a. atmospheric pressure is applied to one side of the diaphragm.
    b. atmospheric pressure is applied to both sides of the diaphragm.
    c. vacuum is applied to both sides of the diaphragm.
    d. hydraulic pressure is applied to one side of the diaphragm.
    e. hydraulic pressure is applied to both sides of the diaphragm.

11. The cause of disc brakes overheating and their failure to release is most likely caused by:

    a. badly scored brake discs.
    b. seized caliper pistons.
    c. excessive brake disc runout.
    d. badly worn friction pads.
    e. worn piston seals.

12. The following condition would most likely be observed in a car with disc brakes having excessive disc runout:

    a. excessive pedal pressure would be required in braking.
    b. the brake pedal would move rapidly in and out.
    c. the car would pull to one side.
    d. there would be rapid brake fade.
    e. the brakes would grab on one or more wheels.

13: Brake chatter would most likely be caused by:

    a. brakes which are adjusted too tight.
    b. the failure of parking brakes to release.
    c. excessively worn brake linings.
    d. loose brake lining rivets.
    e. missing drum dampener springs.

14: The master cylinder must be replaced if clearance between the piston and cylinder exceeds:

    a. .020"
    b. .005"
    c. .002"
    d. .0005"
    e. .010"

15: If the master cylinder provides 500 P.S.I., how much pressure will be provided at a two-inch wheel cylinder?

    a. 100 P.S.I.
    b. 250 P.S.I.
    c. 500 P.S.I.
    d. 750 P.S.I.

16: Which statement BEST describes disc brakes as related to drum brakes?

    a. disc brakes are more effective due to larger cylinders.
    b. disc brakes require less pressure to stop the vehicle.
    c. disc brakes are less effective due to a smaller friction area.
    d. disc brakes are new while drum brakes have been used for many years.

17: Braking effect would be INCREASED by:

    a. using larger wheel cylinders.
    b. using a smaller diameter wheel and drum.
    c. using smaller wheel cylinders.
    d. sliding to a stop rather than slowing to a stop.

18: There is a limit on the amount of material that can be removed from a brake drum because:

    a. the brake shoes would not fit the drum.
    b. the brake drum would give away under stress.
    c. there would be a "grab" during brake applications.
    d. the brake drum would hold heat too long.

19: Two gauges are used to test a metering valve. The gauge on the rear wheel brake line will read:

a. zero P.S.I. while the front line reads 10 P.S.I.
b. 15 P.S.I. as will the front wheel line.
c. the same as that on the front wheel line.
d. 30 P.S.I. before the front wheel line will start to read.

20: Slight scores or roughness of the brake drum:

a. indicate the need for a new drum.
b. should be removed by using a drum lathe.
c. does not impair braking action.
d. indicates that the brake shoes need cam grinding.

21: Which of the following is the BEST place to position safety stands?

a. springs and spring seats
b. engine mounts and differential housing
c. front and rear bumpers
d. frame and lower control arms

22: When using a bumper jack, which of the following is considered a CORRECT procedure?

a. while on a grade, lift the vehicle with the transmission in park
b. while on a level surface, lift the vehicle with the transmission in neutral.
c. lift the vehicle by the side frames.
d. while on a level surface, lift the vehicle with the transmission in park.

23: Which is the BEST method for manually lifting heavy objects:

a. bend over and lift with the back.
b. lift from the side, using arm strength.
c. use both legs and back to lift.
d. squat and lift with the legs, keeping back straight.

24: Which of the following is the PROPER connection for a three-prong 110 volt plug?

a. black wire to brass, white wire to steel, green wire to long prong.
b. green wire to brass, white wire to steel, black wire to long prong.
c. White wire to brass, other two can fit either way.
d. green wire to steel, black wire to long prong, white wire to brass.

25: Residual pressure is needed in a hydraulic brake system in order to:

a. reduce the amount of pressure needed on the brake pedal.
b. prevent air from entering the hydraulic system.
c. keep the fluid at a proper level in the master cylinder.
d. reduce the clearance between the brake shoe and drum.

26: Residual pressure is needed in a hydraulic brake system in order to:

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b. prevent air from entering the hydraulic system.
c. keep the fluid at a proper level in the master cylinder.
d. reduce the clearance between the brake shoe and drum.

27: If the master cylinder vent is plugged, it is probable that:

a. the vacuum created will cause erratic pedal stroke.
b. air will enter the system due to the vacuum created.
c. the wheel cylinder will leak fluid due to the vacuum created.
d. nothing will happen, since the vent is used to remove moisture only.

28: Master cylinder "buildup" is NOT caused by:

a. a swelled secondary cup.
b. an out-of-adjustment master cylinder link pin.
c. air in the system.
d. contaminated fluid.

29: Which is the CORRECT procedure to bleed brakes manually?

a. the bleeder must be closed before the pedal is released.
b. the bleeder must be open when the pedal is released.
c. the filler cap of the master cylinder must be open.
d. the bleeder must be open during the entire operation.

30: Which statement is NOT true regarding power brakes?

a. some power brake units are of the atmospheric suspension type.
b. some power brake units are of the vacuum suspension type.
c. power brakes and air brakes are the same thing.
d. power brakes use a combination of atmospheric and vacuum forces to operate.

31: Which statement is NOT true regarding disc brakes?

a. some disc brake calipers use one piston.
b. disc brake calipers must be removed to remove rotors.
c. some disc brake calipers use four pistons.
d. caliper pistons use return springs.

32: The secondary brake shoe of a "floating anchor" braking system is a:

a. long lining and is located toward the rear of the backing plate.
b. short lining on the rear of the backing plate.
c. long lining on the front of the backing plate.
d. short lining on the rear of the backing plate.

33. Which is the LEAST correct brake service statement?

a. when a brake drum is oversized, oversized lining is needed.
b. some rivets will not score a drum.
c. drum "hard spots" will cause brake problems.
d. drums machined more than .090 are considered safe.

34. Self-adjusting brakes will adjust themselves:

a. when the brake pedal is pumped up.
b. after the pedal is applied and the vehicle is moving backward.
c. when the emergency brake is applied.
d. after the pedal is applied and the vehicle is moving forward.

35. Metal tubing used in the brake system must be:

a. single flared brass tubing.
b. double flared steel tubing.
c. single flared copper tubing.
d. any of the above.

36. The term self-energizing refers to the effect on the:

a. friction between the tire and the road.
b. pressure of the hydraulic fluid.
c. friction between the brake shoe and drum.
d. rear brake shoes only.

37. Select the BEST statement relating to emergency brake adjustment.

a. there is no adjustment.
b. adjustment is made by shortening the cable linkage.
c. emergency brakes are self-adjusting.
d. emergency brakes adjust when normal shoe adjustment is made.

38. Emergency brakes are released by several methods. Which of the following is NOT a release method?

a. vacuum power.
b. pull cable.
c. electro-magnetic.
d. foot trip.

39. Which of the following statments does NOT reflect emergency brake operation?

a. emergency brakes use all four rear shoes.
b. emergency brakes are on the drive line of some cars.
c. the park feature of some transmissions is an emergency brake.
d. some cars use rear wheel shoes for emergency brakes.

40. Which statement is CORRECT in reference to a duo-servo wheel cylinder brake system service?

a. hone, then install spring, two cups and two pistons.
b. hone, then install spring, one cup, one piston.
c. hone, then install two springs, large and small cups and pistons.
d. all of the above.

41: The PROPER toe and heel clearance between brake shoe and drum is

a. .015 inch.
b. .030 inch.
c. .050 inch.
d. .005 inch.

42: Brakes are classified by the way they are applied. Which of the following is NOT a brake classification?

a. vacuum
b. hydraulic
c. mechanical
d. electrical

43: The reason for cam grinding brake shoes is to REDUCE:

a. the pedal effort.
b. the heat on the brake shoes.
c. the coefficient of friction.
d. improper shoe to drum contact.

44: Warped rotors will NOT cause:

a. fluid loss.
b. the driver's foot to pulsate.
c. the brake pads to run hotter than normal.
d. premature wear on the brake pads.

45: When specifications state plus (+) or minus (-), what does the manual mean?

a. a greater or fewer number of cylinders.
b. more or less parts to a cylinder.
c. normal reading tolerances.
d. any reading will do.

46: Which of the following is NOT correct in reference to brake systems?

a. the fluid transfers effort from the master cylinder to the wheel cylinder.
b. copper lines make the best fluid lines.
c. pads and calipers are parts of a braking system.
d. heat will cause out-of-round drums.

47: Which statement below is NOT a good justification for brake repair?

a. the brake drum is scored due to rivet contact.
b. fluid is present in the dust boot.
c. the rivets are 1/64" from drum contact.
d. rain soaked linings require replacement.

48: Select the statement that BEST describes dual master cylinder bleeding with connecting reservoirs (pressure bleeder hookup).

a. attach pressure bleeder to one filler hole with the other one sealed.
b. apply twice normal air pressure in order to bleed properly.
c. connect pressure bleeder to one filler hole with the other one open.
d. the pressure bleeder cannot be used on this type of cylinder.

49: Which statement LEAST describes a pressure bleeder?

a. it is a one-man operation.
b. all cylinders can be bled at one time.
c. it does a better job than manual bleeding.
d. it operates on single and dual master cylinders.

50: Which of the drums listed should NOT be "turned" and placed in service?

a. a drum with hot spots.
b. a drum with a groove .085 inch deep.
c. an out-of-round drum.
d. a tapered or "bell mouth" drum.

51: When turning a drum, sparks from the cutting tool indicate:

a. normal operation.
b. that the drum is turning too fast against the cutter.
c. that the cutter is moving across the drum too slowly.
d. that the cutter is dull.

52: When arboring a drum, which statement is NOT acceptable? (placement on lathe)

a. upright support and center cone is used on a drum without a hub.
b. taper cones are used in roller bearing hubs.
c. radius cones are used in ball bearing hubs.
d. upright support will center a drum without a hub.

53: The cam grinder usually will clear up all of the problems below EXCEPT:

a. the pedal pulsations felt by the driver.
b. pulling to the right due to the unequal diameter of the front drums.
c. the noise due to poor shoe to drum contact.
d. hard pedal pressure due to glazed brake linings.

54: Which of the following air compressor maintenance steps is NOT needed?

a. air tank drained of water.
b. air filter cleaned.
c. a freon check.
d. crankcase oil changed.

55: A brake drum micrometer is a combination of which of the following measuring instruments?

a. a ruler and a scale.
b. a feeler gauge and a scale.
c. the dial indicator and feeler gauge.
d. the dial indicator and ruler.

56: The ideal lining for any particular vehicle is the lining which:

a. has the highest coefficient of friction.
b. has the most wear resistance.
c. is designed for that particular vehicle.
d. has the softest lining.

57: A damaged grease seal may cause the brake to:

a. drag.
b. overheat.
c. pull to one side.
d. all of the above.

58: When the pedal is released, brake fluid is forced back into the master cylinder by:

a. the brake shoe retracting spring.
b. the spring on the brake pedal.
c. the spring in the master cylinder.
d. the vacuum from the master cylinder.

59: How are brakes designed in reference to the USUAL braking effort?

a. equal at the front and rear of the vehicle.
b. front wheel 60 percent, rear wheel 40 percent.
c. rear wheel 60 percent, front wheel 40 percent.
d. front and rear equal but front will apply first.

60: Which statement is TRUE in regard to the adjustment of disc brake pads?

a. change the return spring to adjust.
b. turn a screw to adjust.
c. they are self-adjusting.
d. turn a cam to adjust.

61: The CORRECT procedure for bleeding brakes is to bleed:

a. left front, right front, left rear, right rear.
b. right front, left front, right rear, left rear.
c. left front, left rear, right front, right rear.
d. left rear, right rear, left front, right front.

62: In the hydraulic brake system, movement of the master cylinder piston forces fluid:

a. out of the fluid reservoir.
b. into the power piston.
c. into the hydraulic cylinder.
d. into the wheel cylinder.

63: When cleaning fluid is forced from the master cylinder through the wheel cylinder, the operation is called:

a. flushing.
b. bleeding.
c. filling.
d. cleaning.

64: In disc brakes, the movement of the caliper piston forces the brake lining against the:

a. drum.
b. disc (rotor).
c. caliper.
d. wheel.

65: The anti-skid device operates:

a. only during low speed braking.
b. only during high speed braking.
c. when the wheel tends to stop turning.
d. any time that braking is done.

66: The Sure-Track anti-skid system uses a vacuum-powered activator, an electronic control module and:

a. a load sensing valve.
b. transmission sensors.
c. a governor.
d. wheel sensors.

67: When reassembling a master cylinder, lubricate all parts with:

a. oil.
b. brake fluid.
c. cup grease.
d. mineral oil.

68: The clearance between the piston and the master cylinder wall is NOT acceptable if the reading is over:

a. .001 inch.
b. .002 inch.
c. .004 inch.
d. .005 inch.

69: When a rubber brake hose shows a crack in the outer coating, the hose is:

a. unacceptable and must be replaced.
b. all right since the outer coat always cracks from flexing.
c. dangerous and the driver should be warned.
d. indicative of an improper joint.

DOMAIN V: Engine Systems

Test Item Pool

Domain Statement: Diagnose present and potential engine malfunctions and test, remove, replace or overhaul faulty components.

1. Engine parts that convert reciprocating motion to rotary motion are the:

    a. crankshaft and fly wheel.
    b. piston rod assembly and crankshaft.
    c. cylinder and piston rod assembly.
    d. connecting rod and piston.
    e. fly wheel and piston rod assembly.

2. The I-head or overhead valve arrangement is most widely used because it makes possible engine designs with:

    a. higher compression ratios.
    b. higher clearance volume.
    c. higher intake ratio.
    d. higher compression volume.
    e. higher intake volume.

3. The two types of piston rings are:

    a. compression and locking.
    b. compression and power.
    c. compression and oil control.
    d. compression and expansion.

4. As the temperature increases within the cylinder, pressure:

    a. increases.
    b. decreases.
    c. remains the same.
    d. none of the above.

5. Events take place in the cylinder in which of the following sequences?

    a. exhaust, compression, power, intake.
    b. intake, power, compression, exhaust.
    c. compression, power, intake, exhaust.
    d. intake, compression, power, exhaust.
    e. power, exhaust, compression, intake.

6. Combustion is a chemical reaction during which atoms of oxygen from the air unite with atoms of:

    a. water.
    b. hydrogen.
    c. carbon.
    d. water and hydrogen.
    e. hydrogen and carbon.

7. Main engine bearings are prevented from turning in their housing bore by the bearing:

   a. tang.
   b. spread.
   c. cap torque.
   d. crush.

8. In the Wankel engine the rotor has:

   a. two lobes.
   b. three lobes.
   c. four lobes.
   d. five lobes.
   e. six lobes.

9. The two main sections of the gas turbine engine are the power section and the:

   a. turbine section.
   b. transmission gear section.
   c. gasifier section.
   d. lubrication section.
   e. injector section.

10. Which of the following is CORRECT?

   a. carbon monoxide is a deadly gas.
   b. carbon monoxide is used to inflate the tires on race cars.
   c. carbon monoxide will explode.
   d. carbon monoxide is used in welding.
   e. carbon monoxide is harmless to humans.

11. What is the ADVANTAGE of the hydraulic valve lifter over the mechanical valve lifter?

   a. it has quieter valve action.
   b. it closes the valve faster.
   c. it has more accurate valve timing.
   d. it opens the valve faster.

12. The engine with one valve in the head and one valve in the block is known as the:

   a. T type.
   b. L type.
   c. F type.
   d. I Type.
   e. Y type.

13. The crankshaft changes reciprocating motion to:

    a. parallel motion.
    b. perpendicular motion.
    c. horizontal motion.
    d. forward motion.
    e. rotary motion.

14. Most automobile engine designs are of the:

    a. V-3 type.
    b. V-6 type.
    c. 4 in-line type.
    d. 8 in-line type.
    e. V-4 type.

15. Both intake and exhaust valves are CLOSED during the:

    a. compression stroke.
    b. exhaust stroke.
    c. intake stroke.
    d. none of the above.

16. Most engine main and connecting rod bearings are of the:

    a. bushing type.
    b. ball bearing type.
    c. split sleeve type.
    d. roller bearing type.
    e. tapered roller type.

17. The two major means by which the exhaust valve can lose heat are through the:

    a. valve stem and lifter.
    b. valve stem and valve guide.
    c. valve guide and valve seat.
    d. valve seat and cylinder head.
    e. valve stem and exhaust manifold.

18. A typical V-8 engine will have:

    a. one exhaust manifold.
    b. two exhaust manifolds.
    c. a combination exhaust/intake manifold.
    d. a water-cooled exhaust manifold.
    e. no exhaust manifolds.

19: On typical V-8 engines the manifold extending between the cylinders is the:

    a. intake manifold.
    b. coolant manifold.
    c. vacuum manifold.
    d. exhaust manifold.
    e. none of the above.

20. To check the connecting rod bearings' fit with a plastigage:

    a. do not rotate the crankshaft.
    b. rotate the crankshaft after tightening the cap.
    c. do not tighten the cap to torque specifications.
    d. place plastigage between the bearing and the cap.
    e. place plastigage between the bearing cap and the block.

21. Compute oil bearing clearance from the following micrometer readings: crankshaft outside diameter = 2.488, crankshaft bearing inside diameter = 2.490.

    a. 2.012
    b. 0.014
    c. 0.004
    d. 2.002
    e. 0.002

22. Which one of the following is NOT the recommended practice for using a micrometer?

    a. using it on flat surfaces.
    b. using it on round pieces.
    c. clamping it tightly to workpiece.
    d. using it on a clean surface to be measured.
    e. keeping the instrument clean.

23. If noticeable cylinder ridges are not removed during engine disassembly, this will most likely cause:

    a. rod damage.
    b. cylinder damage.
    c. bearing damage.
    d. piston damage.

24. Failure to properly clean piston ring grooves will cause the piston and rings when replaced in their respective cylinders to:

    a. lack compression.
    b. seize.
    c. knock.
    d. tilt.
    e. none of the above.

25. An engine knock under a heavy load is most likely to be a:

    a. close tappet clearance
    b. loose camshaft bearing.
    c. worn main bearing.
    d. worn rod bearing.
    e. collapsed hydraulic lifter.

26. Connecting rods should be checked for misalignment by:

    a. usual insepction.
    b. using micrometers.
    c. using a jig or aligner
    d. comparison with a new rod.
    e. using calipers.

27. Low cylinder compression can cause:

    a. an engine knock.
    b. hard starting.
    c. retarded timing.
    d. poor fuel economy
    e. both b and d.

28. The more that the plastigage is flattened when checking bearing oil clearance, the:

    a. less the bearing clearance.
    b. thicker the bearing shell.
    c. more the bearing clearance.
    d. thinner the bearing shell.
    e. thinner the crankpin journal is.

29. Black smoke from the exhaust system is often an indication of:

    a. a partially burned fuel charge.
    b. worn piston rings.
    c. extremely late valve timing.
    d. antifreeze seeping into the combustion chamber.
    e. valve not adjusted properly.

30. On many heavy duty engines, the valve is additionally cooled by having their hollow stem partly filled with:

    a. water.
    b. hydrogen.
    c. cadmium.
    d. sodium.
    e. lithium.

31. The turning effort produced by the engine is called:

    a. twist.
    b. torque.
    c. power ratio.
    d. horsepower.
    e. brake horsepower.

32. If the timing chain drive gear on the crankshaft has 18 teeth, how many teeth does the camshaft drive gear have?

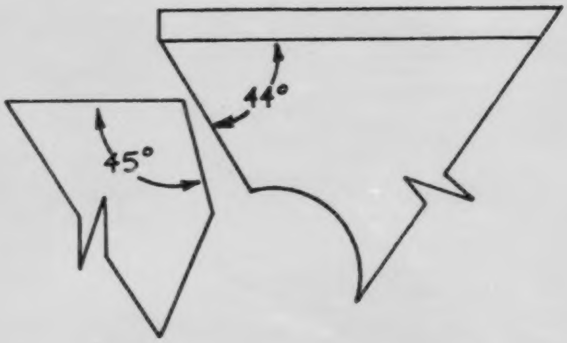
a. 18 teeth.
b. 27 teeth.
c. 36 teeth.
d. 44 teeth.
e. 9 teeth.

33. The terms overlap, duration, and degrees refer to the engine.

a. ignition timing.
b. thermal efficiency.
c. operating temperature.
d. efficiency.
e. valve timing.

34. The valve seat and valve face angle difference shown below is referred to as:

a. clearance angle.
b. narrowing.
c. interference angle.
d. margin angle.
e. undercutting.



35. What is the cubic inch displacement of an engine having a 3-inch bore, a 4-inch stroke, and 8 cylinders?

a. 126.19 in 3
b. 226.19 in 3
c. 307.02 in 3
d. 289.01 in 3
e. 235 in 3

36. The reference point from which valve timing checks are often made is the mark on the flywheel that indicates the flywheel position just as the:

a. exhaust valve opens.
b. intake valve closes.
c. exhaust valve closes.
d. intake valve opens.
e. both intake and exhaust valves close.

37. During a major engine tune up, the valve clearance should be checked:

    a. after checking the compression.
    b. before checking the compression.
    c. when the engine is cold.
    d. after new ignition points have been installed.
    e. should be the last step in a major tune up.

38. The dry compression reading of a cylinder is 80 lbs. By adding oil to this cylinder, the compression increased to 120 lbs. What is the probable trouble in that cylinder?

    a. bad valve guides.
    b. bad valve guide seals.
    c. valves adjusted too tight.
    d. worn piston rings.
    e. burnt valve.

39. The only approved method of removing the grit and chips from a cylinder that has been honed or rebored is by washing the cylinder with:

    a. kerosene.
    b. gasoline.
    c. solvent.
    d. soap and water.
    e. a dry rag.

40. A finished valve seat should contact the valve face approximately:

    a. at the upper edge.
    b. at the lower edge.
    c. anywhere on the valve face.
    d. in the center of the valve face.
    e. at a 90° angle.

41. In a hydraulic valve lifter, if a clearance of at least .030 cannot be obtained when the plunger of the lifter is bottomed in the lifter cylinder:

    a. the valve seat must be cut deeper into the block.
    b. the top end of the plunger must be ground off.
    c. the end of the valve stem must be ground off to get the clearance.
    d. the unit must be replaced.
    e. a new lifter should be replaced.

42. To prevent scuffing and scoring of new rings and to add to ring life, they must be:

    a. coated with a porous bronze.
    b. plated with cadmium, tin, or chrome or coated with black magnetic oxide
    c. ground to a high polish on the ring face.
    d. made with a tapered face.
    e. coated with plastic.

43. To improve the cooling in a vehicle operated at low speed, the fan can be made to draw air through the total area of the radiator by:

a. increasing the pitch of the fan blades.
b. increasing the number of fan blades.
c. using a smaller pulley to increase fan speed.
d. installing a shroud on the back of the radiator.
e. increasing radiator hose diameter.

44. The water house connection most likely to collapse from the suction of the water pump is the

a. lower hose.
b. upper hose.
c. by-pass hose.
d. heater hose.
e. none of the above.

45. At what temperature will the cooling liquid boil in a cooling system with a pressure radiator cap that is rated at 15 lbs.

a. 212^{o} F
b. 220^{o} F
c. 257^{o} F
d. 260^{o} F
e. 215^{o} F

46. The requirement of a bearing which allows it to absorb dirty particles and thereby reduce the possibility of scratching the crankshaft is:

a. load-carrying capacity.
b. imbedability.
c. oil clearance.
d. bearing spread.
e. conformation.

47. Piston ring end gap is determined by using a:

a. feeler gauge.
b. outside micrometer.
c. inside micrometer.
d. caliper.
e. straight edge.

48. In a four-stroke-cycle engine, the camshaft speed is:

a. the same as the crankshaft speed.
b. four-times the crankshaft speed.
c. twice the crankshaft speed.
d. one-half the crankshaft speed.
e. not related to the crankshaft speed.

49. Which is the CORRECT sequence of tightening the head bolts?

a.

	5		4		3		2		1	
11		10		9		8		7		6

b.

	8		4		1		5		9	
11		7		3		2		6		10

c.

	7		8		9		10		11	
1		2		3		4		5		6

d.

	3		7		11		8		4	
2		6		10		9		5		1

50. A crankshaft measured with a micrometer is found to be uniformly worn .001. The recommended service procedure would be to:

a. regrind the crankshaft.
b. install .001 oversized bearings to original crankshaft.
c. install .001 undersized bearings to original crankshaft.
d. replace the crankshaft.

51. The six bearing requirements are: load-carrying capacity, fatigue resistance, corrosion resistance, conformation and:

a. bearing spread and wear rate.
b. oil clearance and imbedability.
c. oil clearance and wear rate.
d. bearing spread and oil clearance.
e. wear rate and imbedability.

52. After honing a cylinder, clean the wall with:

a. hot water and scouring powder.
b. a mixture of oil and kerosene.
c. a rag soaked with gasoline.
d. warm water and soap.
e. a rag soaked with a lacquer thinner.

53. The major enemy of service work in engine overhauling which can lead to early failure is:

a. dull tools.
b. dirt.
c. steam cleaning.
d. insufficient tools.
e. all of the above.

54. The force that causes the engine to run is the:

a. exhaust gas leaving the cylinder.
b. high pressure gases pressing on the piston.
c. gasoline's chemical energy released when mixed with air.
d. compression ratio between gasoline and air.

55. A rocker arm is used in the valve train to:

    a. compensate for valve train lash.
    b. locate the valves for easy accessibility.
    c. allow for ease of disassembly.
    d. reverse the direction of valve train motion.

56. The power the engine produces is proportional to the:

    a. maximum engine speed.
    b. volume of the intake charge.
    c. engine displacement.
    d. compression ratio of the engine.

57. A diesel engine requires:

    a. a special igniter.
    b. expensive fuel blends.
    c. timed fuel injection.
    d. large intake and exhaust valves.

58. Overhead valve arrangements are designed to provide the engine with:

    a. less oil loss past the valve guide.
    b. a simplified low cost cylinder head.
    c. an ideal camshaft location.
    d. good engine breathing.

59. High compression ratios result in:

    a. high combustion pressures.
    b. high speed operation.
    c. smooth power output.
    d. smooth acceleration at medium speeds.

60. Engine horsepower results from the engine's:

    a. torque and compression ratio.
    b. speed and displacement.
    c. torque and speed.
    d. compression ratio and displacement.

61. In passenger car engines, the bottom of the intake manifold is usually flat. Which of the following is the BEST reason for this design?

    a. to have the largest cross section possible for the manifold wall area.
    b. to improve fuel evaporation in the manifold.
    c. to allow space for two runner levels.
    d. to conform to block design.

62. An engine's volumetric efficiency relates directly to:

a. gasoline octane and atmospheric pressure.
b. engine speed and gasoline octane.
c. atmospheric pressure and engine load.
d. air consumpton and engine speed.

63. The exhaust crossover in the intake manifold is MOST helpful to engine operation during:

a. warm-up.
b. engine starting.
c. acceleration.
d. all of the above.

64. A shield is used between the engine interior and the base of some intake manifold castings to:

a. direct the crankcase gases to the ventilating system.
b. prevent engine oil leakage.
c. control the amount of heat that gets to the manifold.
d. minimize oil cooking and burning.

65. The muffler silences the exhaust by:

a. holding the pressure within the exhaust system.
b. removing the noise producing vibrations.
c. gradually releasing the high pressure gas.
d. none of the above.

66. Valves are closed by the:

a. camshaft.
b. spring.
c. rocker arm.
d. push rod.

67. When checking for the amount of ring end gap, place the ring:

a. on the piston.
b. at the top of the cylinder travel.
c. halfway into the cylinder bore.
d. at the bottom of the cylinder travel.

68. Exhaust valves can be made smaller than intake valves because:

a. exhaust gas moves at higher speeds.
b. intake gases are cooler.
c. exhaust gas has expanded.
d. intake gases require more area.

69. Sodium filling is used in some exhaust valves to:

    a. keep the gas from getting so hot.
    b. transfer heat from the valve head to the valve guide.
    c. lighten the valve for high speed operation.
    d. increase valve strength.

70. Oil seals are used on valves to keep the oil from getting into the:

    a. intake manifold.
    b. water jacket.
    c. cylinder.
    d. cooling system.

71. Compression rings are often coated. The coating that withstands high temperature scuffing the best is:

    a. molybdenum.
    b. chromium.
    c. teflon.
    d. iron oxide.

72. Expanders are used with some piston rings. Their primary purpose is to:

    a. make up for cylinder wear.
    b. reduce dynamic tension.
    c. increase static tension.
    d. compensate for ring wear.

73. High pressure combustion gases leak through the top ring gap. This leakage:

    a. helps seal the second ring.
    b. is undesirable.
    c. overloads the second ring.
    d. is finally controlled by the oil ring.

74. If the cylinder ridge is not removed when new rings are installed, it will most likely cause trouble after reassembly by:

    a. allowing blow-by.
    b. breaking the second piston land.
    c. causing pre-ignition.
    d. allowing the piston to hit the valve.

75. Before the valves are pushed out of the valve guide, they should be checked for:

    a. burrs at the lock grooves and tip.
    b. burned valve faces.
    c. broken valve springs.
    d. damaged valve locks.

76. Low speed, full throttle operation, or lugging will lead to early engine bearing failure called:

    a. embedded failure.
    b. wiping failure.
    c. fatigue failure.
    d. scoring failure.

77. Valve timing and engine breathing are based on:

    a. piston position.
    b. crankshaft rotation angle.
    c. connecting rod motion.
    d. combustion rate.

78. The valves are fully open when the piston is:

    a. near the bottom center.
    b. near the top center.
    c. moving near maximum velocity.
    d. approaching maximum acceleration.

79. One ADVANTAGE of an overhead camshaft is:

    a. the reduction of engine cost.
    b. a quieter running engine.
    c. an increase in engine rigidity.
    d. an engine with less moving parts.

80. Engine power is produced in the combustion chamber by:

    a. an explosion of the induction charge.
    b. expanding gases.
    c. high temperature.
    d. the air-fuel ratio and ignition.

81. Approximately how much of the gasoline total heat energy is transferred into useful work?

    a. 25 percent
    b. 50 percent
    c. 75 percent
    d. 100 percent

82. Distance times force equals:

    a. power.
    b. work.
    c. inertia.
    d. energy

83. The rate, or speed, at which work is done is called:

    a. power.
    b. force.
    c. inertia.
    d. energy.

84. One horsepower is:

    a. 3,300 foot-pounds per second.
    b. 33,000 foot-pounds per second.
    c. 3,300 foot-pounds per minute.
    d. 33,000 foot-pounds per minute.

85. The difference between the amount of air that actually enters the cylinder and the amount that could enter under ideal conditions is called the:

    a. compression ratio.
    b. compression efficiency.
    c. volumetric ratio.
    d. volumetric efficiency.

86. On Chevrolet engines with the ball-pivot rocker arm, adjustment of the valve clearance is made by:

    a. replacing the push rod.
    b. replacing the rocker arm.
    c. turning the adjusting nut.
    d. turning the adjusting screw.

87. Carbon accumulations in the combustion chamber are the result of:

    a. oil.
    b. gasoline.
    c. water.
    d. dirt.

88. A weak valve spring should be:

    a. stretched.
    b. heat treated.
    c. reinstalled with spacer.
    d. replaced.

89. If a valve is ground to a point where the margin is eliminated, it will:

    a. overheat.
    b. seal better.
    c. run cooler.
    d. close quicker.

90. When a gauging plastic is used to measure bearing clearance, the more the plastic is flattened, the:

  a. thinner the bearing shell.
  b. greater the bearing clearance.
  c. less the bearing clearance.
  d. none of the above.

91. Valve sticking could be caused by gum or carbon deposits on the stem:

  a. excessive spring pressure or warped stems.
  b. cocked spring or worn camshaft.
  c. warped stem or cracked spring.
  d. all of the above.

92. The type valves used on the Wankel engine are:

  a. poppet.
  b. sliding.
  c. rotary.
  d. none of the above.

93. The Wankel engine and conventional piston engine are alike because both have:

  a. a water pump.
  b. connecting rods.
  c. a valve mechanism.
  d. an apex seal.

94. The Wankel engine and the conventional piston engine differ in that one engine does NOT have:

  a. a water pump.
  b. an oil pump.
  c. an ignition distributor.
  d. a valve camshaft.

95. The initial ADVANTAGE of the Wankel engine over the other internal combustion engines is that:

  a. no spark plug is necessary.
  b. there are fewer moving parts.
  c. the flywheel is eliminated.
  d. it has a high horsepower output.

96. Which of the following is NOT replaced during an engine overhaul?

  a. piston rings.
  b. main bearing.
  c. connecting rod bearings.
  d. camshaft bearings.
  e. none of the above.

97. To avoid injury, the compressed air hose should:

    a. be used to blow dirt off your clothes.
    b. be pointed toward the ground at all times.
    c. never be used to blow dirt off clothes.
    d. be used to clean off work benches and floors.

98. The purpose of engine oil is to reduce friction, form a good seal, absorb shocks and:

    a. burn with little residue.
    b. clean and cool the engine.
    c. improve gas mileage.
    d. extend spark plug life.

99. As the temperature rises on S.A.E. 30 oil, the viscosity of the oil:

    a. increases.
    b. decreases.
    c. remains the same.

100. Which of the following descirbes oils of a LOWER viscosity when compared to oils of a higher viscosity?

    a. thicker, or less fluid
    b. thicker, or more fluid
    c. thinner, or more fluid
    d. thinner, or less fluid

101. The amount that the viscosity of oil changes with changing temperatures is indicated by its:

    a. viscosity index.
    b. variability index.
    c. variability/viscosity index.
    d. temperature index.

102. Crankcase sludge is MOST likely to form during:

    a. summer highway driving.
    b. winter highway driving.
    c. long trip driving.
    d. short trip driving.

103. An S.A.E. 20 oil is:

    a. more viscous than S.A.E. 10 oil.
    b. less viscous than S.A.E. 10 oil.
    c. the same as S.A.E. 10 oil.

104. Considering service ratings, the recommended oil for short trip driving with a lot of starts and stops is:

a. ML oil.
b. MC oil.
c. MM oil.
d. MS oil.

105. The USUAL recommendation is to change oil every:

a. month or 1000 miles, whichever occurs first.
b. three months or 3000 miles, whichever occurs first.
c. six months or 7000 miles, whichever occurs first.
d. nine months or 9000 miles, whichever occurs first.

106. Squeeze-out resistance of lubricating oil, or its ability to stay in place in the engine bearings during compression refers to the oil's:

a. body.
b. pour point depressant.
c. fluidity.
d. viscosity index.

107. A GOOD lubricating oil must have the proper viscosity and adequate resistance to:

a. oxidation, carbon formation and sludge formation.
b. foaming, burning and sludge formation.
c. foaming, carbon formation and oxidation.
d. carbon formation, cooling and oxidation.

108. If you have been using MS oil, under the new classifacation you will use:

a. CD oil.
b. SB oil.
c. SA oil.
d. SD oil.

109. In the new classifacation system, the "D" prefix stands for

a. depressant.
b. diesel engine.
c. density.
d. detergent.

110. A GOOD place to connect a master gauge to check oil pressure is at the: at the:

a. oil light sender port.
b. rocker shaft.
c. timing cover.
d. oil pan.

111. Noisy hydraulic lifters indicate:

   a. high oil pressure.
   b. aerated oil.
   c. improper valve timing.
   d. improper ignition timing.

112. Which of the following oil pump components is free to "float" in the housing bore?

   a. drive gear.
   b. inner rotor.
   c. outer rotor.
   d. all of the above.

113. Three classifications of friction are:

   a. dry, greasy and viscous.
   b. dry, wet and liquid.
   c. dry, liquid and solid .
   d. dry, greasy and oily.

114. Causes of excessive engine oil pressure include:

   a. stuck relief valve, heavy oil, or worn engine bearings.
   b. stuck pressure indicator, stuck relief valve, or low oil level.
   c. heavy oil, worn engine bearings, clogged oil line.
   d. clogged oil line, stuck relief valve, or heavy oil.

115. If the oil filter feels hot after it has been operating a SHORT time, then probably the:

   a. oil flow is normal.
   b. relief valve is not working.
   c. oil pressure is high.
   d. oil pressure is low.

116. A sticking crankcase ventilation valve causes:

   a. excessive oil consumption and overheating.
   b. poor idling and stalling.
   c. crankcase sludge and overheating.
   d. blow-by and poor idling.

117. In the closed-crankcase ventilating system, crankcase vapors are delivered to the:

   a. atmosphere.
   b. intake manifold.
   c. exhaust manifold.
   d. purifier.

118. Causes of low engine oil pressure include:

a. stuck oil pump relief valve, heavy oil, or worn engine bearings.
b. stuck pressure indicator, heavy oil, or low oil level.
c. worn engine bearings, thin oil, or low oil level.
d. stuck oil pressure relief valve, thin oil or clogged oil line.

119. The two basic types of oil pumps are the:

a. rotor and diaphragm.
b. gear and diaphragm.
c. gear and rotor.
d. diaphragm and piston.

120. The oil pressure relief valve, which opens to relieve excessive pressure, may contain either a:

a. plunger or ball.
b. diaphragm or lever.
c. plunger or rod.
d. diaphragm or ball.

121. There is a bypass valve in:

a. the bypass filter assembly
b. the even flow filter assembly.
c. all of the oil filter assemblies.
d. the full flow filter assembly.

122. The two basic types of electrical oil pressure indicators are the:

a. pressure-expansion and thermostatic.
b. balancing-coil and thermostatic.
c. full-flow and balancing-coil.
d. balancing-coil and pressure-expansion.

123. The two MAIN factors affecting oil consumption are:

a. engine speed and temperature.
b. worn engine parts and temperature.
c. engine oil level and speed.
d. worn engine parts and speed.
e. engine oil level and temperature.

124. A MAJOR cause of oil loss from an engine is:

a. crankcase dilution.
b. burning in the combustion chamber.
c. burning in the crankcase chamber.
d. oil vapors escaping to the atmosphere.

125. Two basic types of lubricating systems are the:

a. splash and oil nozzle feed.
b. splash and bypass.
c. pressure feed and vacuum.
d. combination splash and pressure feed.

126. The purpose of the oil pressure relief valve in the pressure feed system is to:

a. assure adequate pressure.
b. prevent excessive pressure.
c. prevent insufficient lubrication.
d. assure adequate oil circulation.

127. The use of a compression and/or cylinder leak gauge will determine the:

a. crankshaft bearing wear.
b. valve lifter operation.
c. ring wear.
d. valve stem guide wear.

128. Which of the following does NOT apply? Glowing of the oil pressure warning light may be followed by:

a. crankshaft bearing failure.
b. camshaft bearing failure.
c. water pump failure.
d. piston ring failure.

129. Disposable, screw-on filters should be installed and tightened:

a. with a strap wrench.
b. by hand, 3/4 to 1 turn after the gasket makes contact.
c. with a pipe wrench.
d. by any of the above methods.

130. The BEST definition of viscosity is:

a. weight.
b. pounds per square inch.
c. API service classification.
d. ability to resist flowing.

131. Water sludge forms in the crankcase from the mixing of:

a. water and fuel.
b. water and gas.
c. water and oil.
d. water and air.

132. LOW oil pressure could be due to:

    a. a strong relief valve spring.
    b. high pump speed.
    c. tight engine bearings.
    d. worn engine bearings.

133. Oil bleed holes are used in connecting rods to:

    a. lubricate the piston pin.
    b. control air flow through the bearings.
    c. control maximum oil pressure.
    d. prevent oil leakage from the engine.

134. Oil feed holes are placed in main bearings at the:

    a. highly loaded portion.
    b. lightly loaded portion.
    c. most convenient location.
    d. end of the oil passage.

135. An EXCESSIVE amount of oil coming out of the oil filler cap indicates:

    a. high oil pressure.
    b. high crankcase pressure.
    c. a defective pressure relief valve.
    d. a clogged oil filter.

136. The maximum viscosity of engine oil is limited by the:

    a. engine's horsepower.
    b. engine's ability to crank when cold.
    c. oil's thin fluid body.
    d. engine's maximum operating temperature.

137. When selecting a suitable engine oil, it is necessary to consider the viscosity and the:

    a. thickness.
    b. oil additives.
    c. API service classification.
    d. cold cranking characteristics.

138. To prevent or reduce aerated oil in the engine, modern oils contain a small amount of chemical additive called:

    a. foam inhibitor.
    b. detergent dispersant.
    c. oxidation inhibitor.
    d. corrosion and rust inhibitor.

139. Distillation is a process of obtaining which of the following from crude oil?

   a. gasoline and fuel oil.
   b. kerosene and heating fuel.
   c. thinners and solvents.
   d. lubrication oil and grease.
   e. all of the above.

140. The purpose of crankcase ventilation is to:

   a. remove liquid gasoline and water.
   b. remove vaporized gasoline and water.
   c. cool the oil.
   d. supply oxygen to the crankcase.

141: A bearing leak detector can be used to check bearing clearance. Which of the following oil run-off from bearings indicates excessive clearance?

   a. no run-off.
   b. 20-25 drops per minute.
   c. a steady stream.
   d. all of the above.

142. Should the oil pressure light glow while driving.

   a. stop the car and check for oil leaks while the engine is running.
   b. it is not necessary to do anything.
   c. stop the car and the engine to check the oil level.
   d. stop the car and check the oil level while the engine is running.

143. To determine the condition of a PCV valve, remove the oil filler cap, start the engine and place a piece of paper over the oil filler. A properly operating PCV valve should:

   a. hold the paper to the oil filler.
   b. blow the paper away from the oil filler.
   c. draw the paper into the oil filler.
   d. have no effect on the paper.

144. Which of the following may lead to an early breakdown of the lubricating system?

   a. checking the oil level every month only.
   b. changing the oil every three months.
   c. changing the oil filter every six months.
   d. replacing the PCV valve every year.

145. In reference to engine oil, viscosity is:

a. the measure of resistance of oil to motion or flow.
b. the cohesion of oil.
c. the ability of oil to clean.
d. all of the above.

146. Which of the following is NOT true concerning engine lubrication?

a. it provides a liquid film on which metal parts can ride.
b. it seals the gap between the parts.
c. it carries the heat of friction to the crankcase.
d. it creates heat for a faster combustion.

147. A compression and leakage test is performed on an engine to detect:

a. defective rings.
b. worn cam bearings.
c. a leaking valve gasket.
d. improper timing.
e. leaking exhaust manifold.

148. Which of the following BEST describes leaking rings as indicated on a vacuum gauge?

a. low and steady needle.
b. rapid vibration of needle.
c. floating motion of needle.
d. needle remains steady and normal.
e. needle is normal when first started, then drops to zero and raises to below normal slowly.

149. When torquing the cylinder head or intake manifold bolts, you would:

a. begin on the shorter bolts and work to the longer ones.
b. torque in any manner, just as long as they are all torqued to the manufacturer's specifications.
c. begin in the center and work outward, torquing to the manufacturer's specifications.
d. begin at either end and torque each bolt to the manufacturer's specifications then go to the next bolt.

DOMAIN VI: Power Train Domain

Test Item Pool

Domain Statement: Diagnose present and potential power train malfunctions and test, remove, repair and replace faulty components.

1. In the modern differential, the type of gearing used for the drive pinion and ring gear is:
   a. spur.
   b. spiral bevel.
   c. hypoid.
   d. spur bevel.
   e. straight tooth.

2. Clutch pedal free travel is the distance:
   a. between the clutch pedal released position to the point of engaging the clutch.
   b. from the released pedal position to the bottom of the clutch pedal travel.
   c. between the point of engaging the clutch to the bottom of the clutch pedal travel.
   d. from the half-way position of the pedal to the point of disengaging the clutch.
   e. from the full released position to the full engaged position of the clutch.

3. If half of the coil cushion springs on the clutch disc were broken, the following condition would probably result:
   a. slipping.
   b. chatter.
   c. no release.
   d. spongy clutch pedal.
   e. burned clutch facings.

4. A squeak that occurs only when the clutch is depressed is most likely due to:
   a. oil or grease on the clutch facing.
   b. a warped pressure plate.
   c. improper adjustment.
   d. unequal spring strength.
   e. poor pilot bearing lubrication.

5. What is the most likely trouble if noise is heard when the clutch is disengaged?
   a. pilot bearing noise.
   b. rear transmission bearing.
   c. release bearing.
   d. clutch cushion springs.
   e. torsional coil spring.

6. If clutch pedal free travel is too small, the:
   a. clutch may not disengage properly.
   b. torsional coil springs may be weakened.
   c. throw-out bearing may rotate constantly.
   d. pilot bearing will wear rapidly.
   e. clutch will tend to chatter.

7. If during a differential overhaul a defective cone and roller assembly or a defective cup is found:
   a. adjust the ring gear.
   b. replace both parts.
   c. replace only the defective part.
   d. set pinion clearance correctly.
   e. install new differential side gears.

8. Driving the sun gear and holding the planet carrier of a planetary gear set provides:
   a. direct drive
   b. neutral
   c. reverse rotation.
   d. increased speed.
   e. decreased speed.

9. If the differential noise is present only when the car is rounding a curve, the trouble is most likely due to:
   a. heavy heel contact on gear teeth.
   b. heavy toe contact on gear teeth.
   c. light toe contact on gear teeth.
   d. bad differential bearings.
   e. worn spider gears.

10. To correct heavy face contact on the ring gear teeth, move the:
    a. drive pinion in.
    b. drive pinion out.
    c. ring gear in.
    d. ring gear out.
    e. ring gear in and drive pinion out.

11. If a humming noise from the differential is most noticeable when accelerating, the most likely cause would be:

    a. heavy heel contact on gear teeth.
    b. heavy toe contact on gear teeth.
    c. binding in the differential.
    d. bad pinion bearings.
    e. worn side gears.

12. The distance between adjacent meshing teeth of mounting gear is called:

    a. clearance.
    b. pitch line.
    c. backlash.
    d. flank.
    e. toe pitch.

13. Free wheeling is accomplished in an overdrive transmission with the use of a:

    a. sun gear.
    b. planetary gear.
    c. balk ring.
    d. roller clutch.
    e. solenoid and pawl.

14. When a standard transmission slips out of high gear, the most probable cause is:

    a. countershaft drive gear wear.
    b. misalignment between engine and transmission.
    c. insufficient lubricant in transmissions.
    d. excessively worn transmission bearings.
    e. excessive end play in cluster gear.

15. When a three-speed standard transmission is in neutral with the engine running, which of the following parts are turning?

    a. input shaft and reverse idler gear.
    b. input shaft and main shaft
    c. countershaft and low-reverse sliding gear.
    d. main shaft and second gear.
    e. second gear and low-reverse sliding gear.

16. Locking together any two members of a planetary gear set provides:

    a. direct drive.
    b. neutral.
    c. reverse rotation.
    d. increased speed.
    e. reduced speed.

17. The drive line between the engine and the wheels consists of the transmission, drive shaft, rear axle:

    a. clutch, universal joints, and axle shafts.
    b. clutch, shock absorbers, and axle shaft.
    c. universal joints, front axle, and sway bar.
    d. suspension, universal joints, and springs.

18. What is the purpose of the universal joint?

    a. transmit power into the differential.
    b. transmit power to differential at various angles.
    c. allows for a shorter drive shaft.
    d. allow for a lower tunnel effect.

19. Automatic transmission oil is generally cooled by circulating it through the:

    a. standard radiator core.
    b. section of the heater core.
    c. cooling tubes along the chassis.
    d. cooling coils in lower radiator tank.

20. On most automatic transmission equipped cars, they cannot be pushed started because:

    a. the one-way clutch free-wheels.
    b. the sun gear is free running on the output shaft.
    c. there is no rear oil pump to provide control pressure to operate the clutches and bands.
    d. the torque converter does not turn.

21. Automatic transmission torque converter is increased by the use of:

    a. one member.
    c. three members.
    b. two members.
    d. four members.

22. In some transmissions, a positive engagement of the bands is assured by assisting the servo with:

    a. a relief valve.
    c. a clutch dram
    b. a regulator valve.
    d. an accumulator

23. Torque multiplication in a torque converter is increased by using a:

    a. fluid coupling
    c. clutch
    b. governor
    d. stator

24. In the automatic standard transmission, the transmission gear ratio in high gear is 1 to:

    a. .7
    c. 1.7
    b. 1
    d. 2.6

25. A clutch mechanism is used to:

    a. raise or lower the vehicle.
    b. control the wheel spin in mud.
    c. connect and disconnect the engine to the transmission.
    d. connect and disconnect the transmission to the drive line.

26. A clutch mechanism may be operated by all EXCEPT which of the following?

    a. manual linkage.
    b. human power.
    c. hydraulic pressure.
    d. engine power.

27. The pressure plate applies pressure on the:

    a. pilot bushing.
    b. clutch disc.
    c. flywheel.
    d. release bearing.

28. The clutch disc lining is made of:

    a. aluminum.
    b. nylon.
    c. an asbestos composition.
    d. rayon.

29. The clutch disc lining is secured to the disc with:

    a. epoxy glue.
    b. clips.
    c. bolts.
    d. rivets.

30. Force is exerted on the pressure plate by:

    a. air pressure.
    b. spring pressure.
    c. hydraulic pressure.
    d. all of the above.

31. Release bearings are of the:

    a. graphite and ball bearing type.
    b. graphite and roller bearing type.
    c. ball bearing and roller bearing type.
    d. needle and ball type.

32. Manual transmissions fall into which of the following design classes?

    a. closed case and square case.
    b. open case and square case.
    c. closed case and open case.
    d. open case and round case.

33. Which gear tooth design will operate with the LEAST noise?

    a. spur
    b. helical
    c. bevel
    d. worm

34. A clutch which is noisy when the pedal is depressed and the engine is running indicates:

    a. a worn pilot bearing.
    b. insufficient pedal free-travel.
    c. a faulty release bearing.
    d. none of the above.

35. When installing a clutch disc, which side contacts the flywheel?

    a. the side with longest part of the hub extension.
    b. the side with the short section of hub extension.
    c. either side.
    d. the side according to the manufacturer's specifications.

36. Clutch cover fasteners should be released:

    a. alternately.
    b. individually a few turns at a time.
    c. all at one time.
    d. one at a time.

37. Free-travel in the clutch pedal should be about:

    a. 1 inch.
    b. 1 7/8 inches.
    c. 2 inches.
    d. 2 1/4 inches.

38. Before removing the clutch assembly, disconnect the:

    a. fan belt.
    b. ignition coil
    c. spark plug wire.
    d. battery ground strap.

39. The manual transmission's gear ratios are determined at the factory according to:

    a. tire size.
    b. transmission size.
    c. differential size.
    d. car weight and engine horsepower.

40. Before removing the transmission, it is necessary to:

    a. remove the negative battery terminal.
    b. lift the vehicle and set the safety stands in position.
    c. drain the transmission.
    d. all of the above.

41. When the transmission is being removed or installed, it would NOT be allowed to rest on the:

    a. output shaft.
    b. input shaft.
    c. motor mount.
    d. cross member.

42. Before disassembling a transmission, it is necessary to:

    a. remove the drive shaft.
    b. clean the exterior of the transmission.
    c. clean the drive shaft.
    d. clean the shift mechanism.

43. Which of the following transmission components are used in the high gear position?

    a. clutch shaft and cluster.
    b. clutch shaft, counter gear, and output shaft.
    c. clutch shaft and output shaft.
    d. synchronizer and cluster.

44. In the high-speed gear position, the power travels through the clutch shaft, clutch gear:

    a. countershaft, countershaft high gear, second and high gear.
    b. countershaft second and high gear, mainshaft.
    c. second and high gear, synchronizer, mainshaft.

45. In the reverse gear position, the power travels through the clutch gear, the counter gear:

    a. reverse countershaft gear, reverse idler, low and reverse gear, main shaft.
    b. low and reverse gear, main shaft low and reverse gear.
    c. reverse gear, low and reverse gear.

46. If the transmission sticks in gear, the most likely cause is a:

    a. slipping clutch.
    b. worn bearings.
    c. worn linkage.
    d. loss of fluid.

47. The most likely cause of clutch slippage is:

    a. excessive pressure plate spring tension.
    b. insufficient pressure plate spring tension.
    c. excessive pedal lash.
    d. excessive pedal free-travel.

48. Clutch pedal free-travel is corrected by adjusting the:

    a. release levers.
    b. clutch linkage.
    c. release bearing.
    d. pivot ball.

49. If the clutch chatters or grabs when engaging, chances are the trouble is:

    a. in the clutch linkage.
    b. in the clutch itself.
    c. due to misalignment of the transmission and engine.
    d. a "nervous" pedal.

50. The friction disc is splined to the:

    a. crankshaft.
    b. transmission output shaft.
    c. clutch shaft.
    d. counter shaft.

51. The clutch is positioned between the transmission and the:

    a. power train.
    b. engine.
    c. propeller shaft.

52. The throw-out bearing is forced to move by the:

    a. pressure on the friction disc.
    b. pivoting of the clutch pedal.
    c. pivoting of the clutch fork.

53. In the coil-spring clutch, when the throw-out bearing is moved inward, it actuates the:

    a. pressure plate.
    b. disc.
    c. release levers.
    d. clutch fork.

54. If a 10-tooth gear is meshed with a 25-tooth gear, the gear ratio is

    a. 10:25
    b. 2:5
    c. 1:2.5
    d. 1:.25

55. In gear systems, speed reduction means:

    a. torque reduction.
    b. torque increase.
    c. nothing.

56. In first gear, the power travels through the clutch shaft:

    a. drive gear, second gear, first gear, and shaft.
    b. low gear, drive gear, low and reverse gear, and main shaft.
    c. counter gear, low gear, low and reverse gear, and main shaft.

57. Before assembly, the transmission should:

    a. be thoroughly cleaned.
    b. be lubricated.
    c. have new gaskets and seals installed.
    d. have all worn parts replaced.
    e. all of the above.

58. When assembling a transmission, it is necessary to always check:

    a. for leaks.
    b. the end play of all parts.
    c. worn parts.
    d. lubricant level.

59. A gear from a manual transmission should never be re-used if it shows any signs of:

    a. chipping.
    b. excessive wear.
    c. galled surfaces.
    d. all of the above.

60. Before adjusting the shift linkage, the manual transmission must be placed in:

    a. second.
    b. neutral.
    c. reverse.
    d. first.

61. An open one-piece propeller shaft would have:

    a. two universal joints and one slip joint.
    b. two universal joints and one velocity joint.
    c. two velocity joints and one universal joint.
    d. one universal joint and one slip joint.

62. The ADVANTAGE of a two-piece propeller shaft is that it allows:

    a. a greater change in the angle between the transmission and the differential.
    b. a better body design.
    c. a better gear ratio.
    d. the use of a high speed transmission.

63. The difference between a universal joint and a velocity joint is that the velocity joint has a ball and socket plus:

    a. two universal joints.
    b. one universal joint and one slip joint.
    c. two universal joints and one trunion.
    d. two slip joints and one universal joint.
    e. one universal joint and one center bearing.

64. The parts in a non-slip differential include a ring gear, a pinion gear, differential pinion gears:

    a. axle gears and a rotor.
    b. clutch plates and axle gears.
    c. a sprag clutch and axle gears.
    d. clutch plates and worm gears.

65. The path of the power flow in a conventional differential is pinion gear, ring gear:

    a. differential pinion gears, axle gears, axles and rear wheels.
    b. carrier cage, axle gears, axles and rear wheels.
    c. axle gears, differential pinion gears, cluster gear and rear wheels.
    d. differential pinion gears, axle gears, spur gears and rear wheels.

66. If one wheel tries to spin faster than the other, the non-slip differential becomes engaged and:

    a. the wheel with less traction spins faster.
    b. the wheel with excessive traction spins faster.
    c. equal torque is applied to each wheel.
    d. none of the above.

67. A two-piece propeller shaft consists of a slip joint and:

    a. two universal joints, a velocity joint and a center bearing.
    b. two velocity joints, one universal joint and a center bearing.
    c. one universal joint, a center bearing and a pinion shaft.
    d. none of the above.

68. Which of the following gears is NOT part of a conventional differential?

a. sliding gear.
b. drive pinion gear.
c. axle gear.
d. ring gear.
e. differential pinion gears.

69. A differential with clutches is classified as a:

a. slipping.
b. torque multiplier.
c. non-slip.
d. none of the above.

70. The MOST popular type of universal joint in an open propeller shaft is a:

a. cross and roller.
b. hotchkiss joint.
c. slip joint.
d. spider and yoke.

71. Which of the following is the CORRECT adjustment sequence for a conventional differential assembly?

a. coast, drive, backlash, and pinion bearing preload.
b. backlash, pinion preload, side carrier preload, and pinion depth.
c. pinion depth, pinion bearing preload, side carrier bearing preload and backlash.
d. pinion bearing preload, side carrier bearing preload, coast and backlash.

72. Using a hydraulic post lift to test a conventional differential safely for a malfunction, it is necessary to:

a. check to see that the rear wheels are free to turn.
b. place jack stands under the frame.
c. free the rear tire treads of any foreign matter.
d. remember to never put selector in reverse or park while rear wheels are turning forward.
e. all of the above.

73. It is necessary for both wheels on a locking differential to be off the floor when spin testing because:

a. one will not spin independently of the other.
b. only one will lock unless spun at high RPM's.
c. the left wheel spins counterclockwise and the right spins clockwise.
d. all of the above.

74. Using the hydraulic post lift to test for a defective universal joint in a vehicle with an open propeller shaft:

a. speed the engine up 800 to 1000 RPM's, apply brakes and shift from low to reverse and observe slack and noise.
b. speed the engine up 4000 to 5000 RPM's and shift from low to reverse rapidly and observe slack and noise.
c. run engine at 10,000 RPM's and check for vibration.
d. none of the above.

75. Which of the following is NOT considered a safety factor when testing a car on the dynamometer?

a. safety chains.
b. set emergency brakes
c. wheel chocks.
d. not exceeding torque load.
e. not exceeding safe engine RPM.

76. When overhauling an open propeller shaft, the bearing cups should NEVER be:

a. forced into their bores.
b. packed full of grease.
c. exposed to dirt or abrasives.
d. none of the above.
e. all of the above.

77. When overhauling a two-piece propeller shaft, care should be taken not to damage the ball and seat of the:

a. universal joint.
b. slide joint.
c. expansion joint.
d. one-piece joint.
e. velocity joint.

78. When road testing a car for a noise in the differential and it makes the noise only when making a turn, the MOST likely problem is a:

a. defective ring gear and pinion.
b. bent drive shaft.
c. defective universal joint.
d. defective differential pinion and axle gears.

79. If a differential will make a noise only when coasting, the MOST probable cause is a(n):

a. worn pinion bearing.
b. improper backlash adjustment.
c. defective axle bearing.
d. defective side carrier bearing.
e. improper pinion depth adjustment.

80. A non-slip differential has the same gears that a conventional differential has plus a:

    a. spanner nut.
    b. torque sleeve.
    c. set of clutch plates.
    d. double reduction gear set.
    e. all of the above.

81. When inspecting the bearings in a differential assembly, they should be replaced if they show signs of:

    a. discoloration, pit marks or scoring.
    b. scoring, maladjustment or embedability.
    c. improper installation.
    d. all of the above.
    e. none of the above.

82. If it becomes necessary to replace a ring gear or pinion gear:

    a. only the pinion gear can be replaced.
    b. only the ring gear can be replaced.
    c. the ring gear and pinion gear can be replaced as a set only.
    d. ring gear or pinion gear can be replaced if adjusted properly.
    e. the complete assembly must be replaced.

83. When replacing a spider and trunion universal joint, it is important to identify it by the:

    a. type of transmission.
    b. type of vehicle and size of engine.
    c. manufacturer's name and if the joint is oversized.
    d. year of the vehicle.
    e. all of the above.

84. In replacing a ring gear and pinion, if the pinion marking on the one being removed is a -2 and the one to be installed is a +2, they:

    a. will not interchange.
    b. will interchange, if adjusted with the proper shim pack.
    c. must never be interchanged.
    d. can only be interchanged in case of emergency.
    e. can be interchanged since the markings are not important.

85. A defective pinion bearing will make a noise most likely:

    a. when the vehicle is under a load or pulling.
    b. when the vehicle is coasting downhill.
    c. when rounding a curve only.
    d. at high speeds only.
    e. when idling at a stop light only.

86. A defective universal joint could cause a vibration plus:

- a. a noise and slack when shifting gears.
- b. harsh shifting of gears.
- c. slow engagement of clutch.
- d. poor gasoline mileage.
- e. none of the above.

87. In order to take care of the movement of the drive line caused by irregularities in the road it must have:

- a. a solid connection from transmission to differential.
- b. a shock absorber at each end.
- c. a slip joint and a universal joint (or joints).
- d. three to six inches of free play at one end.
- e. none of the above.

88. The purpose of a two-piece propeller shaft in a passenger car is to allow:

- a. lowering of the hump in the floor pan.
- b. installation of a longer transmission.
- c. ease in removal and repairs.
- d. more economy in overhauling and repairs.
- e. a higher RPM and less vibration.

89. If a ring gear has 39 teeth and a pinion gear has 13 teeth, the ratio is:

- a. 4 to 1.
- b. 3.1 to 1.
- c. 2.8 to 1.
- d. 4.1 to 1.
- e. 3 to 1.

90. When replacing a 3.11 differential with a 4.10 differential, the

- a. torque would be increased at the driving wheels.
- b. road speed would be increased.
- c. engine would turn less RPM's for the rear wheels to go the same speed.
- d. none of the above.
- e. all of the above.

91. The difference between a torque tube differential and a Hotchkiss is that the:

- a. torque tube propeller shaft is open and the Hotchkiss is closed.
- b. torque tube propeller shaft is closed and the Hotchkiss is open.
- c. torque tube propeller shaft universal joints are easier to remove.
- d. torque tube propeller shaft drives through the leaf springs.
- e. Hotchkiss tube drives through a torque rod.

92. In order for one rear wheel to rotate faster than the other:

   a. two differential pinion gears and two axle gears are needed.
   b. the ring gear and pinion are needed.
   c. one alrge and one small axle gear are needed.
   d. one differential pinion gear and one axle gear are needed.
   e. one large differential pinion gear and one small axle gear are needed:

93. If an axle gear had a broken tooth, it would make a noise ONLY when:

   a. moving in a straight direction.
   b. moving at high speeds.
   c. moving at low speeds.
   d. rounding a curve.
   e. in reverse.

94. When replacing most axle bearings, it is BEST to:

   a. press them on when possible.
   b. drive them on with a punch and hammer.
   c. heat them with a torch and install by expansion.
   d. all of the above.
   e. none of the above.

95. On some vehicles after replacing an axle bearing, it is necessary to adjust the:

   a. backlash.
   b. pinion depth.
   c. axle end play.
   d. pinion preload.
   e. pinion flange torque.

96. To check the differential backlash, it is necessary to use a:

   a. torque wrench.
   b. feeler gauge.
   c. micrometer.
   d. dial indicator.
   e. depth gauge.

97. The MAJOR difference between assembling a non-slip differential and a conventional type procedure is:

   a. the installation of the cluth plates.
   b. the installation of the pinion gear.
   c. the installation of the ring gear.
   d. that all the adjustments are different.
   e. making the backlash adjustment.

98. Axle end play is adjusted by:

a. using shims between the drum and axle flange.
b. torquing axle shaft nut to 250 ft. lbs.
c. using shims between the axle housing and backing plate.
d. using shims between the axle bearing and bearing race.
e. using shims between the bearing and axle.

99. When overhauling a propeller shaft, it should be marked properly before disassembly:

a. for ease of reassembly.
b. because it is a balanced unit.
c. to save time on reassembly.
d. all of the above.
e. none of the above.

100. The method(s) of testing a differential for a noise would be to:

a. road test by accelerating and decelerating and listening for a noise change.
b. place the vehicle on a hydraulic post lift and listening for a noise by running the vehicle in gear.
c. spin one wheel at a time with the car on a floor jack and listening for a noise.
d. all of the above.
e. none of the above.

101. The QUICKEST recommended way to replace an axle bearing is to:

a. cut it off with a cutting torch and drive the new one on with a punch and hammer.
b. press the bearings on and off with the proper tools and a hydraulic hand press.
c. cut it off with a cold chisel and drive the new one on with a punch and hammer.
d. cut it off wiht a hacksaw and drive the new one on with a punch and hammer.
e. heat the old one and drive it off and heat the new one and press it on.

102. The RECOMMENDED time to overhaul a one-piece open propeller shaft is:

a. one hour.
b. four hours.
c. six hours.
d. eight hours.

103. The flat rate time to remove and replace a differential assembly is approximately:

   a. two hours.
   b. eight hours.
   c. nine hours.
   d. twelve hours.
   e. sixteen hours.

104. In order to overhaul a differential in the minimum set time, which of the following is needed?

   a. proper tools.
   b. specifications.
   c. proper replacement parts.
   d. skilled training.
   e. all of the above.

105. Which of the following is NOT a part of the differential assembly?

   a. Idler gear.
   b. Ring gear.
   c. Pinion gear.
   d. Side gear.

106. Which of the following is NOT a part of the limited-slip differential?

   a. Hypoid gears
   b. flexible cross pins.
   c. friction clutch
   d. sun gear

107. The STANDARD automotive differential has:

   a. four gears.
   b. six gears.
   c. eight gears.
   d. ten gears.

108. When the two rear wheels are turning at different speeds, the:

   a. differential pinion gear turns faster than the ring gear.
   b. two bevel side gears are locked together.
   c. differential pinion gear turns on its shaft.
   d. all of the above.

109. On front wheel drive vehicles that have the transmission connected through the driving shafts to the front wheels, each drive shaft has:

   a. a differential side gear.
   b. a universal joint.
   c. two universal joints.
   d. all of the above.

110. A mechanic can correct an unbalanced propeller shaft by:

   a. bending the shaft.
   b. adjusting the universal joints.
   c. adding wittek clamps.
   d. repositioning the shaft angles.

111. When the axle is removed from the housing of a passenger car, the bearing:

   a. stays in the housing.
   b. stays in the differential.
   c. is ruined.
   d. comes out with it.

112. The inner ends of the axle shafts have splines that fit into splines in the:

   a. wheel bearings.
   b. ring gear.
   c. bevel side gears.
   d. all of the above.

113. The care of the universal joint MAINLY consists of periodic:

   a. bearing replacement.
   b. adjustment.
   c. alignment.
   d. lubrication.
   e. all of the above.

114. The type of joint that combines BOTH the universal and the slip joint in one assembly is the:

   a. ball and trunion.
   b. mechanics.
   c. tracta.
   d. cross and roller

115. Before removing the bearing caps, the:

   a. cap and bearing should be marked.
   b. cap and housing should be marked.
   c. cap and bolts should be marked.
   d. bearing and housing should be marked.

DOMAIN VII: Starting and Charging Systems

Test Item Pool

Domain Statement: Diagnose and repair present and potential problems in the starting and charging system components and wiring.

1. Generator regulators should always be set:

   a. at operating temperature.
   b. at room temperature.
   c. at any temperature.
   d. at 80° F.
   e. at 70° F.

2. To check the rated output of a Delcotron alternator, a jumper wire is hooked between:

   a. field and ground.
   b. field and output terminal.
   c. output terminal and ground.
   d. "R" and output terminal.
   e. Field and "R" terminal.

3. The Alternator rotor does the same job as the generator's:

   a. field.
   b. armature.
   c. commutator.
   d. 2 and 3.
   e. all of these.

4. When it first starts to operate, alternator voltage is built up by:

   a. diode current.
   b. residual magnetism.
   c. the cut-out relay.
   d. field excitation from the ignition switch.
   e. starter motion from the fan belt.

5. In order to check the voltage at which the cutout relay points of a regulator close, the voltmeter is connected between the:

   a. field and generator terminals.
   b. field terminal and ground.
   c. generator terminal and ground.
   d. battery and generator terminals.
   e. battery and field terminals.

6. The current regulator unit is adjusted with:

   a. 8 to 10 amperes flowing.
   b. engine operating at high speed.
   c. jumper across voltage regulator points.
   d. no load on the battery.
   e. voltage regulator points open.

7. No output from a generator may be caused by:

   a. one shorted field coil.
   b. low resistance in charging circuit.
   c. open circuited field coils.
   d. voltage regulator points stuck closed.
   e. cut out points stuck together.

8. When testing a generator armature, if test lamp lights when one prod is placed on the commutator bars and the other on the armature core, the armature is:

   a. grounded.
   b. shorted.
   c. in normal operating condition.
   d. open.
   e. usable unless the light is very bright.

9. When setting the current regulator, a carbon pile load is used to:

   a. increase resistance in the field circuit.
   b. increase circuit voltage.
   c. decrease circuit voltage.
   d. lower resistance in the field circuit.
   e. make the generator charge less.

10. When checking maximum alternator output by jumper method the field wire must be removed to protect the:

    a. field circuit.
    b. regulator points.
    c. battery
    d. diodes.
    e. meter.

11. When testing generator fields, if test lamp fails to light when the prods are placed on the two ends of the field windings, the fields are:

    a. shorted.
    b. grounded.
    c. open.
    d. O.K.
    e. not shorted.

12. A defective storage battery is indicated when the variation in specific gravity readings between cells is more than:

a. 5 points.
b. 10 points.
c. 15 points.
d. 20 points.
e. 25 points.

13. High rate discharge test on batteries should be made at temperatures of about:

a. 50° Fahrenheit.
b. 32° Fahrenheit.
c. 80° Fahrenheit.
d. 0° Fahrenheit.
e. 120° Fahrenheit.

14. A battery that repeatedly tests 1200 over a period of time could be due to a high:

a. voltage regulator setting.
b. acid content.
c. circuit resistance.
d. current regulator setting.
e. output alternator.

15. A mechanic testing a battery finds hydrometer readings of 1200, 1210, 1215, 1200, 1215, 1210; he should:

a. replace the battery.
b. put it back in service.
c. recharge, retest, and look further for the trouble.
d. adjust the voltage regulator setting.
e. add acid to the cells.

16. An average 12 volt starter draw during engine cranking would be about:

a. 75 - 150 amps.
b. 300 - 350 amps.
c. 150 - 250 amps.
d. 350 - 400 amps.
e. 200 - 300 amps.

17. Failure of the starter or engine to turn along with heavy dimming of the lights would indicate a:

a. starter locked in flywheel.
b. frozen engine.
c. internal ground in starter.
d. dead battery.
e. all of these.

18. If the lights do not dim and there is no solenoid action, the best bet would be an open circuit in the:

    a. solenoid pull-in coil.
    b. solenoid hold-in coil.
    c. battery to starter switch circuit.
    d. starter switch to solenoid circuit.
    e. a, c, and d.

19. A solenoid that clicks in and out while cranking at normal cranking speed would have:

    a. an open hold-in coil.
    b. an open pull-in coil.
    c. an open starter field.
    d. a very weak battery.
    e. a bad battery connection.

20. If the starter turns but the engine does not start and the lights dim a little, the:

    a. trouble is in the solenoid.
    b. over-running clutch slips.
    c. battery has a bad connection.
    d. bendix is sticky.
    e. b and d.

21. The first natural magnet was called:

    a. the lodestone.
    b. a temporary magnet.
    c. a permanent magnet.
    d. the freestone.

22. The difference in electrical pressure between two poles of a battery is called:

    a. amperes.
    b. ohms.
    c. volts.
    d. resistance.

23. The amount of resistance of a wire does NOT depend on the:

    a. size.
    b. length.
    c. temperature.
    d. cost.

24. The quantity of electrons flowing in circuit is known as:

    a. amperage.
    b. ohms.
    c. resistance.
    d. watts.

25. Battery capacity is determined by the:

    a. amount of electrolyte present.
    b. size of the battery case.
    c. amount of lead in the negative plate.
    d. plate area.

26. If the starter cranks the engine but the engine will NOT start, the trouble may be in the:

    a. starting system.
    b. battery.
    c. charging system.
    d. starter switch.

27. If the starter relay does NOT click when the ignition key is turned to "start" the problem may be in the:

    a. transmission.
    b. ignition system.
    c. battery.
    d. fuel system.

28. If the starter drive engages the flywheel, but the engine FAILS to turn, it may be due to:

    a. a defective battery.
    b. the distributor adjustment.
    c. a locked fuel pump
    d. incorrect timing.

29. If the starter drive is stuck, it may be released by:

    a. pushing the vehicle at 45 M.P.H.
    b. cranking the engine with the starter.
    c. rocking the vehicle.
    d. drifting the vehicle backward in neutral.

30. If the starter spins but will NOT crank the engine, the bendix may be:

    a. too hot.
    b. undersized.
    c. dirty.
    d. out of adjustment.

31. Which of the following is NOT a cause for slow engine cranking?

    a. excessive circuit resistance.
    b. discharged battery.
    c. sulphated battery.
    d. fully-charged battery.

32. In checking a starting system, first determine whether the:

    a. engine is running properly.
    b. generator or alternator has the correct pulley.
    c. starter is turning properly.
    d. battery is in good condition.

33. Which of the following is NOT a battery test?

    a. capacity test.
    b. state-of-charge test.
    c. circuit resistance test.
    d. voltage test.

34. When using a test light to check a diode, the light should go on:

    a. in one direction only.
    b. in neither direction.
    c. in both directions.

35. In the fully transistorized regulator, field current is controlled by the:

    a. diodes.
    b. transistors.
    c. contact points.
    d. rectifiers.

36. The FIRST step in checking the specific gravity of a battery is to:

    a. disconnect the cables.
    b. charge the battery.
    c. add water.
    d. remove the vent plugs.

37. Excessive resistance in a cranking motor circuit can result from:

    a. corroded battery terminals.
    b. an undersized battery.
    c. a discharged battery.

38. Cranking time in excess of 30 seconds can cause the:

    a. battery to overheat.
    b. cranking motor to overheat.
    c. switch contacts to overheat.

39. In some instances, the starter solenoid has an additional function to perform. It is to:

    a. close the choke on the carburetor.
    b. by-pass the ignition resistor.
    c. close the regulator cut-out relay.

DOMAIN VIII: Ignition System

Test Item Pool

Domain Statement: Analyze, remove, adjust or repair and replace faulty ignition system components.

1. A fouled or improperly adjusted spark plug contributes to poor gas mileage because:

   a. the fuel is not completely burned within the cylinder.
   b. the secondary voltage will be lowered.
   c. the ignition timing will be retarded.
   d. the spark plug must fire twice in order to burn the fuel.

2. The engine's lack of power can be the fault of:

   a. an improperly adjusted fan belt.
   b. a defective vacuum control.
   c. a dirty oil filter.
   d. a missing air filter.
   e. a burned out muffler.

3. Using an oscilloscope with an engine that is operating PROPERLY all spark plug spikes should be:

   a. within 25KV of each other.
   b. within 10KV of each other.
   c. within 10KV above or below the plug firing line.
   d. even, not to exceed 45KV.
   e. within 3KV of each other below the plug firing line.

4. The purpose of a condenser is to:

   a. absorb all the high voltage from the coil.
   b. reduce arcing at the breaker points.
   c. time the firing impulse to the spark plug.
   d. intensify the amperage.
   e. all of the above.

5. The primary circuit starts at the battery and continues through the:

   a. solenoid, resistor, ignition switch, coil and points to ground.
   b. coil, ignition switch, resistor and points to ground.
   c. ignition switch, resistor, coil and points to ground.
   d. resistor, ignition switch, coil and points to ground.

6. The ignition coil is constructed in which of the following ways?

   a. soft iron coil, primary winding, secondary winding and filled with oil.
   b. hard iron core, primary winding, secondary winding and filled with oil.
   c. laminated core and 300 turns of large wire.
   d. 3000 turns of fine wire and filled with sodium.
   e. 38,000 turns of #16 wire around a wooden dowel.

7. Which of the following is considered the primary circuit?

   a. battery, starter, solenoid, ignition switch, coil primary and points.
   b. battery, ignition switch, resistor, coil primary, points and condenser.
   c. battery, resistor, rotor, condenser and points.
   d. battery, starter, distributor, resistor and ignition points.

8. Which of the following is considered the secondary ignition circuit?

   a. battery, solenoid, distributor, rotor, plugs and plug wires.
   b. coil secondary, condenser, distributor cap, rotor, plugs and plug wires.
   c. battery, starter, distributor, coil, secondary plugs and plug wires.
   d. coil secondary, rotor, distributor cap, plug wires and plugs.

9. The purpose of the by-pass resistor is to:

   a. reduce battery voltage in the primary circuit from 12 volts to 6-9 volts.
   b. by-pass current from the primary circuit to the starting circuit.
   c. prevent too high a charging rate from entering the primary circuit.
   d. reduce coil output under a load.
   e. protect the diodes in the alternator.

10. The ignition coil can increase battery voltage as high as:

    a. 250 volts.
    b. 1500 volts.
    c. 5000 volts.
    d. 35,000 volts.
    e. 60,000 volts.

11. The vacuum advance unit will advance the timing when:

    a. the vehicle is decelerating.
    b. the vehicle is under a light load only.
    c. the intake manifold vacuum increases.
    d. the vehicle is running at top speed with wide open throttle.
    e. the vehicle is descending a hill, throttle closed.

12. A defective connection in the primary circuit will result in:

    a. the resistor overheating.
    b. a low charging rate.
    c. dim headlights.
    d. low boosted voltage at the spark plugs.

13. In addition to other vital functions, the distributor:

    a. drives the fuel pump.
    b. houses and operates the breaker points.
    c. distributes oil to the rocker arms.
    d. drives the camshaft.

14. Static timing means:

    a. timing with a vacuum gauge.
    b. retarding the timing at idle.
    c. advancing the timing at idle.
    d. timing with the engine not running.

15. The principal ADVANTAGE of the capacitor discharge system compared to the conventional system is that:

    a. it has the ability to fire fouled plugs.
    b. the initial cost is much less.
    c. it is easier to repair.
    d. it eliminates the use of a coil.

16. One of the ADVANTAGES of transistor ignition systems is that:

    a. the load on the condenser is much less.
    b. the coil operates at a lower temperature.
    c. resistor plugs are not required.
    d. the electrical load on the points is lower.

17. The capacitor discharge ignition system:

    a. uses a capacitor in place of a coil.
    b. eliminates all arcing across the points.
    c. increases voltage with a longer rise time.
    d. discharges a capacitor to the coil primary circuit.

18. In which of the solid state ignition systems is the dwell not adjustable?

    a. transistorized ignition.
    b. capacitor discharge ignition.
    c. contact controlled transistor ignition.
    d. magnetic pulse transistor ignition.

19. To protect the components in the transistor ignition system a:

    a. heat dam is used.
    b. heat baffle is used.
    c. heat shield is used.
    d. heat sink is used.

20. The principal ADVANTAGE of the magnetic pulse transistor ignition is that:

    a. it is more economical.
    b. it has fewer parts.
    c. it eliminates the contact points.
    d. it provides lower coil temperatures.

21. A transistor is basically:

    a. a special type of diode.
    b. a magnetic pulse generator.
    c. a device to limit current flow.
    d. an electronic switching unit.

22. The purpose of the resistor built into some spark plugs is to:

    a. reduce wear on the points.
    b. reduce radio and TV interference.
    c. improve high-speed performance.
    d. prolong spark plug life.

23. The order in which the spark plugs fire is established by the order in which the:

    a. plugs are mounted in the engine.
    b. contact points open.
    c. plug leads are connected to the cap.
    d. pistons reach top center.

24. The rotor transmits current between the:

    a. primary winding and the plugs.
    b. secondary winding and the plugs.
    c. primary winding and the battery.
    d. distributor cap and the primary winding.

25. The centrifugal advance mechanism advances the:

    a. breaker plate and points.
    b. breaker cam and rotor.
    c. distributor cap and rotor.
    d. breaker plate and rotor.

26. A chracked spark plug porcelain is usually caused by:

    a. spark rap in the engine.
    b. an improper heat range.
    c. excessive operating temperature.
    d. careless installation.

27. Adjust point contact alignment by bending the:

    a. pivot post.
    b. contact plate.
    c. stationary point bracket.
    d. movable point arm.

28. Dwell angle or cam angle means the:

    a. angle at which the rubbing block contacts the cam.
    b. angle between the lobes on the cam.
    c. degree of rotation at which the points are closed.
    d. degree of rotation at which the points are open.

29. Firing order means the:

    a. direction that the distributor turns.
    b. sequence in which the cylinders are numbered.
    c. sequence in which the cylinders fire.
    d. order in which the pistons reach top dead center.

30. Coil polarity can be reversed by:

    a. installing a different condenser.
    b. reversing the coil-to-distributor secondary wire.
    c. reversing the spark plug cables.
    d. reversing the primary coil wire connections.

31. Increasing the contact point gap:

    a. increases the dwell angle.
    b. retards ignition timing.
    c. decreases the dwell angle.
    d. raises the coil saturation time.

32. The color of normally worn ignition points is:

    a. deep blue.
    b. reddish brown.
    c. dull grey.
    d. silvery.

33. Which of the following parts in the distributor most often requires replacement?

    a. cap.
    b. points.
    c. rotor.
    d. advance mechanism.

34. The vacuum advance mechanism advances ignition timing according to the:

    a. engine speed.
    b. engine load.
    c. road speed of vehicle.
    d. none of the above.

35. The spark plugs' heat range is determined by the:

    a. plug voltage.
    b. direction of current flow.
    c. length of plug cables.
    d. length of insulator.

36. Spark plugs should be torques to:

    a. insure proper heat transfer.
    b. prevent stress breakage.
    c. secure a proper seal.
    d. all of the above.

37. A spark plug that is too cold for the operating conditions of an engine should be replaced by one which has a:

    a. smaller diameter.
    b. longer insulator nose.
    c. shorter insulator nose.
    d. large insulator top.

38. Which of the following is NOT a part of the ignition system?

    a. coil.
    b. points.
    c. solenoid.
    d. distributor.

39. INCORRECT coil polarity causes:

    a. higher plug temperatures.
    b. lower voltage to plugs.
    c. shorter point life.
    d. higher secondary voltage.

40. The primary ignition resistor is designed to:

    a. allow higher flow at high speeds.
    b. protect the primary circuit.
    c. allow higher flow at low speeds.
    d. protect the secondary circuit.

41. Which of the following is in the primary circuit?

    a. spark plug.
    b. rotor.
    c. points.
    d. distributor cap.

42. Which of the following statements is TRUE concerning the two windings of the ignition coil?

    a. the primary winding has more turns.
    b. the secondary winding has heavier wire.
    c. both windings have the same number of turns.
    d. the secondary winding has many more turns than the primary.

43. The ignition condenser is connected across the:

    a. coil secondary.
    b. coil primary.
    c. contact points.
    d. battery.

44. When the contact points are closed, the voltage in the condenser:

    a. goes up.
    b. is zero.
    c. is near its peak.
    d. drops slightly.

45. Normal breaker contact point rubbing block wear causes:

    a. the timing to advance.
    b. shorter coil saturation time.
    c. the timing to retard.
    d. lower coil output.

46. Decreasing point gap:

    a. increases dwell.
    b. decreases dwell.
    c. has no effect on dwell.

47. While some ignition advance mechanisms use manifold vacuum, others may use:

    a. atmospheric pressure.
    b. a venturi vacuum.
    c. a fuel pump vacuum.
    d. none of the above.

48. Which of the following is the LEAST accurate statement regarding burned or pitted contact points?

    a. high primary voltage.
    b. excessive condenser resistance.
    c. under-capacity condenser
    d. spark plug heat range too hot.

49. Pitted ignition points are the result of:

    a. old age.
    b. high voltage.
    c. a high capacity condenser.
    d. a low capacity condenser.
    e. c and d.

50. Blue ignition points are the result of:

    a. old age.
    b. high voltage.
    c. a high capacity condenser.
    d. a low capacity condenser.
    e. c and d.

51. The Ohmic Valve of radio suppression ignition wire per foot when new is:

    a. 1,000 OHMs
    b. 40,000 OHMs
    c. 10,000 OHMs
    d. 20,000 OHMs
    e. 4,000 OHMs

52. Radio suppression type ignition wire cores are:

    a. metallic low resistance wire.
    b. linen or fiberglass impregnated with carbon.
    c. not capable of delivering a good spark.
    d. measurably less resistive with age.
    e. used on all cars and diesel trucks by law.

53. A spark will jump the plug gap with less voltage from the:

 a. side electrode to the center.
 b. center to the side electrode.
 c. side electrode of a hot plug.
 d. positive to negative electrode.
 e. grounded to the positive electrode.

54. As the rubbing block on the movable point wears, the dwell angle:

 a. increases.
 b. decreases.
 c. remains static.
 d. varies up and down.
 e. changes, advancing ignition timing.

55. If the cam rotates as the distributor is removed from the engine:

 a. you were careless.
 b. the drive gear is on the pump.
 c. the drive gear is on the distributor.
 d. the pump drives the distributor.
 e. b and d.

56. The distributor breaker points are a part of the:

 a. secondary circuit.
 b. generator circuit.
 c. starter circuit.
 d. primary circuit.
 e. high voltage circuit.

57. The ignition system condenser is charged as:

 a. breaker points are just closing.
 b. breaker points are just opening.
 c. breaker points are in contact.
 d. current flows through the points.
 e. the spark jumps the spark plug gap.

58. The auxiliary gap spark plug is designed to:

 a. lower the voltage required in the ignition system.
 b. allow a smaller spark plug gap.
 c. raise the heat range of the plug.
 d. reduce misfiring of dirty plugs.
 e. reduce pre-ignition under high speed driving conditions.

59. The capacity of a typical automotive ignition system condenser is:

    a. 6 to 12 volts.
    b. 20 to 25 volts.
    c. .10 to .20 microhms.
    d. .20 to .25 microfarads.
    e. .25 megohm.

60. The centrifugal mechanism and the vacuum advance mechanism provide ignition advance during:

    a. acceleration.
    b. full-load conditions.
    c. part-throttle operation.
    d. full-throttle operation.
    e. idle.

61. Ignition coil secondary voltage may be as high as:

    a. 15 volts.
    b. 20,000 volts.
    c. 1,500 volts.
    d. 150 volts.
    e. 3,000 volts.

62. Scope patterns show time:

    a. horizontally.
    b. vertically.
    c. diagonally.
    d. a and c.
    e. b and c.

63. Increasing the dwell angle will:

    a. retard ignition timing.
    b. have no effect on ignition timing.
    c. advance ignition timing.
    d. cause detonation.
    e. cause pinging.

64. The high-voltage surge that occurs at the spark plug is produced by the ignition coil when the:

    a. condenser ignites.
    b. magnetic field builds up.
    c. ignition points open.
    d. secondary opens.
    e. magneto rotates.

65. Voltage in the ignition primary circuit at the time spark occurs may be as high as:

    a. 250 volts.
    b. 25 volts.
    c. 5 volts.
    d. 2500 volts.
    e. 12-15 volts.

66. The centrifugal advance mechanism in a distributor advances ignition timing by turning the:

    a. cam with rotation.
    b. breaker plate with rotation.
    c. cam aganist rotation.
    d. breaker plate against rotation.
    e. a and d.

67. If the breaker point lever spring is weak, the engine may:

    a. miss at high speed.
    b. miss at low speed.
    c. not start.
    d. not stop.
    e. run retarded.

68. The distributor cap and rotor are a part of the:

    a. primary circuit.
    b. secondary circuit.
    c. charging circuit.
    d. starting circuit.

69. When installing a condenser, the lead wire should be connected to the:

    a. ignition points.
    b. rotor button.
    c. mounting plate.
    d. distributor cam lobe.

70. Distributor shaft cams should be lubricated with high temperature grease to:

    a. prevent distributor shaft wear.
    b. reduce friction at the advance weights.
    c. prevent wear of the contact arm rubbing block.

71. It is important that the ignition coil be correctly connected in the primary circuit. The distributor primary lead should be connected to the coil primary.

    a. marked positive (+).
    b. marked negative (-).
    c. the same as the battery polarity.

72. Increasing the point opening will:

    a. advance the timing.
    b. retard the timing.
    c. not change the timing.

73. If the distributor vacuum line is connected directly to the intake manifold, at idle the ignition timing will be:

    a. fully retarded.
    b. advanced halfway.
    c. fully advanced.

74. Which of the following would be a safe way to operate the oscilloscope?

    a. use a fender cover when working under the hood.
    b. use jack stands to hold rear wheels off the floor.
    c. hook the oscilloscope to the proper connection.
    d. route the leads so they are free of the fan and belts.

75. Cam angle or dwell means:

    a. the number of degrees of distributor cam rotation during the time the points are open.
    b. the angle at which the rubbing block contacts the cam.
    c. the number of degrees the crankshaft rotates from the time the points open until they close.
    d. the distance between the lobes of the cam.
    e. the number of degrees the distributor shaft cam rotates while the points are closed.

76. Which one of the following components CANNOT be checked by using the primary pattern on the scope?

    a. points.
    b. plug wires.
    c. condenser.
    d. resistor.

77. Which of the following BEST describes the pattern on the oscilloscope screen for a defective plug wire?

    a. one spike higher than the others.
    b. one spike does not show on the screen.
    c. one spike has an arc at a 90^{o} angle.
    d. one spike fades out when the plug wire is removed.
    e. one spike shows up as red or orange.

78. Which of the following is used to check the condition of individual plug wires?

    a. voltmeter.
    b. ammeter.
    c. ohmmeter.
    d. tachometer.

79. When setting dwell on an engine and dwell must be increased, which of the following statements is CORRECT?

    a. open the points slightly.
    b. disconnect the vacuum line.
    c. turn the adjusting screw counterclockwise.
    d. lock out the centrifugal advance.
    e. close the points slightly.

80. To install a distributor assembly properly in an engine for correct timing, which of the following statements is CORRECT?

    a. check the firing order and point the rotor toward the number one plug wire.
    b. hook the timing light to the number one plug wire and set timing properly on the power stroke.
    c. position the number one piston at top center (compression stroke) with timing mark on TDC and point the rotor toward the number one plug position on the distributor cap.
    d. set the distributo
       install with the rotor pointed toward one plug wire.
    e. check the valves on number one cylinder and install the distributor with the rotor pointed toward the number one plug wire with the intake valve open.

81. When gauging points, the rubbing block of the points should be located:

    a. on the high point of the cam.
    b. on the breaker plate.
    c. at the base of the distributor.
    d. in line with the rotor button.

82. The primary circuit of the ignition consists of the:

    a. small insulated wiring running to the coil, distributor and resistor.
    b. larger wiring running from the coil and from the distributor to the plugs.
    c. wire from the center of the coil to the center of the distributor.
    d. positive cable from the battery to the solenoid.

83. In making a visual underhood inspection of an automobile that is misfiring, which of the following malfunctions would NOT be obvious?

    a. disconnected plug wires.
    b. blow-by from the oil breather cap.
    c. a cracked distributor cap.
    d. insulation off primary wires.
    e. a broken ground electrode on the spark plug.

84. Which of the following builds the high tension voltage necessary to fire at the plug gap?

    a. battery.
    b. points.
    c. condenser.
    d. coil.
    e. centrifugal advance.

85. The purpose of the ignition condenser is to:

    a. give a hotter spark at the points.
    b. open and close the primary circuit.
    c. reduce arcing at the breaker points.
    d. connect and disconnect the ignition system from the battery.

86. The distributor has three functions. Two of these are to make and break the primary circuit and to distribute high tension voltage to each cylinder. The third is to:

    a. advance or retard timing.
    b. make it possible to start or stop the engine as desired.
    c. reduce the voltage from 12 volts to 6 volts.
    d. store the voltage for high RPM.
    e. assure correct polarity in the ignition system.

87. Which of the following provides the final air gap to fire the combustible mixture in the cylinder?

    a. breaker points.
    b. rotor.
    c. resistor.
    d. spark plug.
    e. condenser.

88. On a typical eight cylinder engine with a dwell setting of 30 degrees, how many degrees of distributor shaft rotation would the points remain open per cylinder?

    a. 15
    b. 26-31
    c. 45
    d. 180
    e. none of the above.

DOMAIN IX: Suspension and Steering Systems

Test Item Pool

Domain Statement: Inspect, adjust, replace or overhaul faulty components in the suspension and steering systems.

1. The most likely cause of severe shimmy would be:

   a. dynamic unbalance.
   b. static unbalance.
   c. an out-of-round tire.
   d. an out-of-round rim.
   e. a bent rim.

2. The maximum permissible total wheel and tire runout is generally:

   a. .050 in. lateral, .050 in. radial runout.
   b. .125 in. lateral, .090 in. radial runout.
   c. .030 in. lateral, .050 in. radial runout.
   d. .200 in. lateral, .150 in. radial runout.
   e. .080 in. lateral, .125 in. radial runout.

3. The best type of repair for tubeless tires which are used for turnpike driving is a:

   a. plug type filler.
   b. moulded internal patch.
   c. moulded external patch.
   d. packing type filler.
   e. cold internal patch.

4. Uneven tread wear caused by over-inflated tires would appear as:

   a. wear on center treads.
   b. feathered edged threads.
   c. wear on one edge.
   d. cups or bald spots.
   e. wear on shoulder treads.

5. When following the manufacturer's specifications while tightening front wheel roller bearings, you should end up with:

   a. absolutely no movement or play.
   b. a slight drag.
   c. about 0 to .004" play.
   d. at least .101" to .015" play.
   e. a and b.

6. When packing front wheel bearings be sure to:

   a. wipe a layer of grease on balls or rollers.
   b. push grease thoroughly through cage.
   c. fill hub with grease level with bearing races.
   d. a and b.
   e. a, b, and c.

7. A steering shaft and worm requires:

   a. no preload on the bearings.
   b. preload on the bushings.
   c. preload on the bearings.
   d. all preload on the shaft.
   e. all preload on the worm.

8. Power steering operating pressures are in the range of:

   a. 60 p.s.i. to 100 p.s.i.
   b. 600 p.s.i. to 1200 p.s.i.
   c. 2000 p.s.i. to 2500 p.s.i.
   d. 10 p.s.i. to 50 p.s.i.
   e. 100 p.s.i. to 400 p.s.i.

9. In order to correct noisy leaf springs, you should:

   a. separate the leaves and lubricate with graphite.
   b. replace the pads.
   c. replace the main leaf.
   d. spray them with oil.
   e. replace the spring.

10. The principal duty of a shock absorber is to:

   a. prevent the spring from rebounding too rapidly after compression.
   b. prevent the spring from compressing too much.
   c. help correct spring sag.
   d. help prevent wheel out-of-balance.
   e. help prevent wheel shimmy.

11. When a leaf type spring is sagging considerably, it is recommended that:

   a. the main leaf only be replaced.
   b. the whole spring be replaced.
   c. both springs in the front and rear be replaced.
   d. the spring should be re-arched.
   e. at least one-half of the leafs be replaced.

12. When leaf springs are used in the rear suspension they:
    - a. require the use of a sway bar.
    - b. reduce the unsprung weight.
    - c. absorb the torque of the rear wheels.
    - d. eliminate the need of a stabilizer bar.
    - e. must use a heavier duty shock absorber than coil springs.

13. If the king pin or steering axis is tilted backward, the angle is called:
    - a. positive camber.
    - b. negative caster.
    - c. negative camber.
    - d. positive caster.
    - e. negative steering axis inclination.

14. A good front end alignment job includes:
    - a. checking tire pressures.
    - b. inspecting the front end for loose or worn parts.
    - c. checking for spring sag.
    - d. adjusting caster, camber, and toe in.
    - e. a, b, c, and d.

15. A wheel that tilts inward at the top has:
    - a. positive camber.
    - b. negative caster.
    - c. negative camber.
    - d. positive caster.
    - e. negative steering axis inclination.

16. The inward tilt of the king pin or steering axis at the top is called:
    - a. caster.
    - b. camber.
    - c. toe-in.
    - d. steering axis inclination.
    - e. turning radius.

17. The distance the front of the front wheels are closer together than the rear of the front wheels is called:
    - a. caster.
    - b. camber.
    - c. toe-in.
    - d. steering axis inclination.
    - e. turning radius.

18. Directional stability can be increased by increasing:

    a. positive camber.
    b. negative caster.
    c. negative camber.
    d. positive caster.
    e. negative steering axis inclination.

19. If toe-out on turns is incorrect, the trouble is:

    a. the tie-rod is too long.
    b. a steering arm is bent.
    c. the tie-rod is too short.
    d. a spindle is bent.
    e. the pitman arm is bent.

20. The front end angle to adjust when a tire is severely feather-edged would be:

    a. caster.
    b. camber.
    c. toe-in.
    d. steering axis inclination.
    e. toe-out on turns.

21. Which of the following gear boxes is MOST frequently used in American cars?

    a. worm and roller.
    b. reciprocating ball and nut.
    c. rack and pinion.
    d. worm and stud.

22. In steering gears using a tooth roller, the tooth roller is in mesh with the:

    a. worm.
    b. sector.
    c. steering shaft.
    d. pitman arm.

23. While steering gear bearings suffer some wear, which parts COMMONLY show wear in a worm and roller gear?

    a. sector shaft to pitman arm.
    b. steering shaft to column.
    c. sector shaft itself.
    d. worm and roller.

24. The BEST way to check wear on ball joints is to:

    a. remove the weight from the joint.
    b. make sure weight is on joint.
    c. grease joint to remove slack.
    d. grasp tire front and rear and shake it.

25. The sector shaft has the gear sector at one end and the:

    a. worm shaft at the other end.
    b. pitman arm at the other end.
    c. ball nut at the other end.
    d. steering wheel at the other end.

26. How many total number of bearings does the sector shaft use?

    a. 1
    b. 2
    c. 3
    d. 4

27. When turning wheels from one stop to the other with a car jacked up, a rough feel in steering indicates:

    a. a normal feel.
    b. a bad pitman arm.
    c. rough worm bearings.
    d. pitted sector shaft bearings.

28. If the wheels are straight ahead and there is too much slack caused by the steering gear, then it is necessary to adjust the:

    a. ball nut to worm.
    b. worm bearing.
    c. sector to pitman arm.
    d. any of the above.

29. Rubber bushings are used in spring eyes to:

    a. make them easier to remove.
    b. suppress vibrations and noise.
    c. reduce wear on metal parts.
    d. all of the above.

30. If a vehicle pulls constantly to one side, caused by misalignment, then there is an indication that which of the following is INCORRECT?

    a. camber.
    b. toe-in.
    c. caster.
    d. turning radius.

31. If a vehicle has excessive tire wear on the outside of treads, caused by misalignment, then there is an indication that which of the following is INCORRECT?

    a. camber.
    b. toe-in.
    c. caster.
    d. turning radius.

32. The suspension springs/oscillation is controlled by the:

    a. torque arm.
    b. radius rods.
    c. sway bar.
    d. shock absorbers.

33. While springs normally hold curb height of the vehicle, shock absorbers sometimes also lift if they are of the:

    a. air-oil type.
    b. air-oil with a pump type.
    c. heavy duty type.
    d. all of the above.

34. The automatic level control includes the air pressure lines, special shock absorbers, a control valve and the:

    a. intake manifold.
    b. compressor.
    c. rear springs.
    d. sway bar.

35. The essential difference between standard shock absorbers and the super-lift shock absorbers used in the automatic level control is that the super-lift:

    a. is larger.
    b. acts slower.
    c. acts faster.
    d. has a sealed air chamber.

36. In the steering system, the pitman arm is splined to the:

    a. steering arm.
    b. tie rod.
    c. sector shaft.
    d. car frame

37. The devices attached to leaf springs which permit the springs to change in length as they flex are called:

    a. hooks.
    b. bolts.
    c. hangers.
    d. shackles.

38. Which of the following is a part of the steering gear assembly?

    a. Slack adjuster
    b. Drag link
    c. Steering arm
    d. Idler arm

39. Which of the following is NOT a part of a power steering assembly?

    a. Reciprocating ball and nut
    b. Piston
    c. Spool valve
    d. Slipper

40. The following question requires the use of a specification manual. Which of the following is a good front end setting for a 1970 Chevrolet car with a V-8 engine?

    a. Caster +3/4°, camber +1/4°, toe-in 1/8"-1/4" in
    b. Caster 0°, camber 0°, toe-in 0"
    c. Caster -1/2°, camber -1/4°, toe-in 1/16" in
    d. Caster +1/4°, camber +1°, toe-in 1/16" out

41. If flat rate time is 1.5 hours and the labor rate is $8.00 per hour, the correct labor charge is

    a. $10.50
    b. $11.50
    c. $12.00
    d. $13.00

42. Which of the following is NOT a method of changing the camber and caster?

    a. Intershaft slops on an elongated bolt hole
    b. Change the height of the spring lift
    c. Turn cam on lower intershaft and bushing
    d. Shims placed between intershaft and frame

43. In relationship to the front of the vehicle, the positive caster inclines the spindle support in which of the following directions?

    a. Toward the front
    b. Out from center
    c. In from center
    d. Toward the rear

44. A sawtooth tread wear pattern indicates misalignment of the

    a. turning radius.
    b. camber.
    c. caster.
    d. toe-in.

45. While worn parts will cause irregular tire wear, a deep cup followed by smaller ones indicates problems with

    a. a static unbalanced wheel.
    b. the toe-in.
    c. the camber.
    d. the caster.

46. The procedures for using a wheel balancer are different according to the make of the vehicle. However, for all vehicles it is necessary to

    a. wash the wheel and tire.
    b. gauge the tire pressure.
    c. remove rocks from the tire tread.
    d. mark the tire to the rim.

47. Dynamic unbalance is corrected by installing weights on the wheel

    a. directly across from each other.
    b. diagonally to each other.
    c. top and bottom of the same side.
    d. All of the above

48. Ball joints are installed in many ways. Which of the following is NOT a method used?

    a. Bolted
    b. Threaded
    c. Rivets
    d. Pressed
    e. Welded

49. To remove coil springs, it is necessary to jack up the car, remove the wheel assembly, remove the shock and sway bar linkage, and then lower the spring out by

    a. loosening the lower ball joint stud, lowering the A-frame, removing the coil.
    b. loosening the intershaft, lowering the A-frame, removing the coil.
    c. loosening the ball joint stud and intershaft, lowering the A-frame and coil together.

50. A pitted condition in the wheel bearings is MOST likely caused by lack of lubrication or by

    a. chemicals.
    b. dirt.
    c. moisture.
    d. heat.

51. Which of the list below is NOT a good lubrication for wheel bearings?

    a. Moly-based
    b. A mixture of molylighium and sodium-based lubrication
    c. Lithium-based
    d. Sodium-based

52. When a bumper jack is used to lift the front of a vehicle, for safety reasons the rear wheels must be

    a. locked.
    b. jacked first.
    c. free to roll.
    d. chocked.

53. Which of the following is NOT true concerning the safe installation of a vehicle on a front end machine?

    a. Chock the wheels
    b. Leave the wheels unchocked
    c. Make sure the wheels are at the center of the rack
    d. Turn off the ignition switch with the car in park gear

54. Air compressors need periodic service. Which of the following services is NOT needed?

    a. Clean and/or replace air filter
    b. Change lubrication oil
    c. Drain moisture from air tank
    d. Change oil filter

55. The fluid that is used to fill service floor jacks is

    a. hydraulic oil.
    b. brake fluid.
    c. transmission fluid.
    d. shock oil.

56. When replacing coil springs on the front suspension, the coils should be

    a. held by hand while jacking into place.
    b. retained with a special locking device.
    c. positioned on an A-frame and jacked without holding.

57. Coil springs are USUALLY held in position by

    a. being bolted to the frame.
    b. being clamped to the frame.
    c. pressure or weights.
    d. shackles.

58. To remove a tire rod end that is to be used again, remove the nut and then

    a. hit the top of the stud with a hammer to break it loose.
    b. use a puller to remove the ball stud.
    c. use a forked knocker to remove the ball stud.
    d. ball stud will drop out.

59. Two basic types of power steering systems are the

    a. integral and valve.
    b. booster and power.
    c. valve and linkage.
    d. integral and linkage.

60. Three types of oil pumps used in power steering systems are the slipper, vane and

    a. piston.
    b. roller.
    c. gear.
    d. shoe.

61. While most front ends use ball joints, the twin I beam (for pivot and support) use

    a. king pins.
    b. ball and trunion.
    c. ball and socket.
    d. trunions.

62. In torsion bar suspension, the springing action is produced in the long bars by

    a. compression.
    b. expansion.
    c. a twisting action.
    d. a slipping action.

63. Uni-body construction refers to a vehicle with

    a. no frame, but body is stressed.
    b. short frames and stressed body.
    c. "X" frame and bolted on.
    d. box frame and body bolted on.

64. Which of the list below is NOT a frame used for a vehicle?

    a. Uni-body construction
    b. Boxed
    c. "X" plus boxed
    d. Wedged

65. Twisting force is absorbed in the rear suspension with coil springs by the

    a. springs themselves.
    b. torque arm.
    c. sway bar.
    d. shock absorbers.

66. The BEST pliers to use for removing cotter pins are

    a. needle-nosed.
    b. waterpump (offset jaw).
    c. diagonal.
    d. combination slip-joint.

67. The springing action of the torsion bar is produced by

    a. compression.
    b. a twisting action.
    c. friction.
    d. a slipping action.
    e. a pulling action.

68. Which of these would NOT cause a hard steering problem?

    a. Tightened pulley
    b. Glazed belt
    c. Steering sockets dry
    d. Uneven tire pressure

69. Which of the following causes low steering pump pressure?

    a. Worm gear not preloaded
    b. Steering arm loose
    c. Belt oily.
    d. Control valve stuck

70. Which of the following is a part of the frame?

    a. Wheel house panels
    b. Springs
    c. Cross members
    d. Drive shaft

71. Which of the following BEST describes integral frame and body construction?

    a. Structural strength members
    b. Unitized
    c. Partial frame
    d. Separate steel frame
    e. Short stub frame

72. Which of the following would be considered SAFE wearing apparel?

a. Goggles
b. Watches
c. Rings
d. Loose fitting clothing

73. Which of the following tires would have the MOST strength?

a. 2 ply/4 ply rating
b. 4 ply rating
c. 6 ply rating
d. 8 ply rating

74. Which of the following bearings is COMMONLY used in automobile front wheels?

a. Sleeve
b. Precision insert
c. Bronze
d. Needle
e. Roller

75. A misaligned suspension will NOT cause

a. the tires to squeal on turns.
b. hard steering.
c. excessive tire wear.
d. a pull to one side.
e. excessive strain on the springs.

76. Which of the following is NOT found in the independent front wheel suspension system?

a. Ball joints
b. Solid front axle
c. Coil spring
d. Shock absorber
e. Pitman arm

77. Which statement is NOT true concerning tires?

a. two-ply/four-ply rating indicates four layers of two-ply twisted cord.
b. "belted bias" means cord put on the tire diagonally to the body of the tire.
c. steel belted tires are stronger than rayon belted tires.
tubeless tires can be two or four-ply rated.

78. Which of the following statements is NOT true?

a. static balance is balance at rest.
b. static balance is balance in motion.
c. static unbalance will cause the wheel to hop.
d. static unbalance can be corrected.

79. Which is NOT a proper step in the operation of the tire changer to change a 14 inch tire?

    a. remove the valve stem core to release the air.
    b. install the wheel on the tire changer with the outside of the wheel up.
    c. break the tire from the wheel rim.
    d. install the tire and inflate to the proper pressure.

80. The BEST way to remove a bearing from a hub is to:

    a. use a line punch and drive out the bearing.
    b. use a pry bar to pry the bearing out of the hub.
    c. use a cold chisel to cut the bearing.
    d. install a spindle nut on the spindle, hook the bearing over the nut and jerk it out.

81. Whichis NOT a proper step in changing a "spin on" oil filter?

    a. drain the engine oil.
    b. use a special tool to remove oil filter.
    c. lubricate the new oil filter gasket.
    d. install and tighten the filter with a wrench.

82. Which of the following statements is NOT true?

    a. dynamic balance is balance in motion.
    b. dynamic balance is balance at rest.
    c. dynamic balance can be corrected.
    d. dynamic unbalance will cause wheel shimmy.

DOMAIN X: Emissions Control

Test Item Pool

Domain Statement: Analyze, test, repair or replace automobile emissions control devices.

1. Black smoke from a vehicle tail pipe indicates the engine:

   a. has excessive "blow-by".
   b. is burning oil.
   c. is running too "rich".
   d. none of the above.

2. An engine "diesels" or "runs" after the ignition switch is turned off. This is most often cause by:

   a. overheated engine.
   b. too lean.
   c. idling too fast at shut down.

3. Excessive valve lash (tappet clearance) will result in:

   a. increased valve overlap and increased duration.
   b. increased valve overlap and decreased duration.
   c. decreased valve overlap and decreased valve lift.
   d. decreased valve overlap and increased valve lift.

4. When ignition timing is retarded, idle speed drops. This decreased in idle speed is due to:

   a. a lean air-fuel mixture in the cylinder.
   b. a rich air-fuel mixture in the cylinder.
   c. the shortened burn time of the air-fuel mixture.
   d. less heat energy exerted on the piston.

5. An engine with this firing order, 14283675, which cylinder besides #1 will flash a timing light so you can see the marks?

   a. 8
   b. 5
   c. 3
   d. none of them.

6. To perform a cylinder compression test you:

   a. remove all spark plugs and test.
   b. leave all spark plugs in and test.
   c. remove one spark plug at a time and test.
   d. on a V-8 remove one bank at a time and test.

7. When manifold vacuum is 16" but venturi and spark port vacuum are 0", the engine is:

   a. stopped.
   b. running at 2500.
   c. idling.

8. You suspect one flat lobe on the cam shaft. Which diagnosis test would you use to further support your suspicion?

   a. compression test.
   b. cylinder leakage test.
   c. cylinder balance test.

9. A cranking vacuum test is done with:

   a. all spark plugs in.
   b. all spark plugs out.
   c. one spark plug out at a time.

10. On what two strokes do most of the hydrocarbons reach the crankcase:

    a. intake and exhaust.
    b. compression and power.
    c. exhaust and power.
    d. power and intake.

11. Two owners with identical cars are going together on a trip. Owner A is towing a 16' travel trailer. Owner B will tow nothing. Both engines need vacuum diaphrams in their distributors but you only have one. Considering only GAS MILEAGE so less combined fuel is burned by these two cars on this trip, which owner should get the new distributor diaphram?

    a. owner towing trailer.
    b. makes no difference.
    c. owner not towing.

12. If ignition specs are: Initial timing 0°, total advance 25°, mechanical advance 10°, how many degrees is vacuum advance?

    a. 15°
    b. 35°
    c. 30°

13. You change the dwell on an engine from 30 to 26. What effect does this have on timing?

    a. no change.
    b. advances it.
    c. retards it.

14. Spark plugs that missfire because of "Bridging" one or two days after a tune up are an indication of:

    a. owner's bad driving habits.
    b. poor quality spark plugs.
    c. heavy combustion chamber deposits.

15. The owner knows he has: (a) one open plug wire, (b) a weak coil, (c) high float level, (d) no vacuum advance in the distributor. He will pay to fix only one of these problems.

    a. Which one would you fix if he can't start it cold?

       (a) (b) (c) (d)

16. If you advance initial timing it will:

    a. increase idle RPM.
    b. decrease idle RPM.
    c. have no effect on RPM.

17. When intake manifold vacuum is applied at idle to the retard diaphragm on an engine equipped with a dual diaphragm distributor, the breaker plate:

    a. moves opposite to distributor rotation.
    b. moves in the same direction as distributor rotation.
    c. does not move.
    d. may move in either direction depending on amount of vacuum.

18. Not enough "Float Drop" will probably cause trouble when:

    a. starting a warm engine.
    b. idling a warm engine.
    c. driving at high speed with wide open throttle.
    d. cruising on level road at 25 MPH.

19. A "dash pot" failure will be noticed:

    a. on acceleration.
    b. on starting engine.
    c. on deceleration.

20. Replacing main metering jets with leaner ones may:

    a. raise gas mileage.
    b. lower gas mileage.
    c. may do either of the above.

21. You are cruising at 50 MPH on a level road. Your manifold vacuum gauge reads 14". Which carburetor circuit is not operating?

    a. float circuit.
    b. high speed circuit.
    c. power circuit.

22. A choke vacuum brake failure will be noticed:

    a. on a fully warm engine.
    b. on cold engine drive-away.
    c. when trying to start flooded cold engines.

23. Power valve circuits are normally:

    a. closed at idle.
    b. open at idle.
    c. neither of the above.

24. The "fuel level" setting and the "float level" setting are the same measurement.

    a. true
    b. false

25. Vapor lock is caused by:

    a. using gasoline of the wrong octane number.
    b. too much heat on the fuel pump and lines.
    c. too much fuel pump pressure.

26. Heated carburetor air is necessary on emissions controlled engines because:

    a. of the altered advance curve.
    b. of the retarded timing used.
    c. of the leaner carburetor mixture used.
    d. none of the above.

27. You have adjusted the idle mixture screws using a tachometer only and obtained a satisfactory smooth idle. When you check the exhaust emissions with an HC-CO meter you discover HC-CO readings above "specs." The problem could be:

    a. one mixture needle too lean and one too rich.
    b. both needles too rich.
    c. both needles too lean.
    d. a or b of the above.
    e. all of the above.

28. EGR is used to:

    a. reduce HC-CO
    b. increase gas mileage
    c. reduce NO_x

29. CEC solenoids and idle stop solenoids both hold the throttle plates slightly open. Which one also controls the distributor vacuum?

    a. CEC solenoid.
    b. idle stop solenoid.

30. When the diverter valve, used on air injection systems, diverts air to the atmosphere it is triggered into action by:

    a. a sudden drop in manifold vacuum.
    b. the air pump.
    c. exhaust gas pressure.
    d. high manifold vacuum.

31. The owner knows he has: (a) one open plug wire, (b) a weak coil, (c) high float level, (d) no vacuum advance in the distributor. He will pay to fix only one of these problems.

    a. Which one would you fix if he only wants lower HC emissions?

       (a) (b) (c) (d)

32. The owner knows he has: (a) one open plug wire, (b) a weak coil, (c) high float level, (d) no vacuum advance in the distributor. He will pay to fix only one of these problems.

    a. Which one would you fix if he only wants lower CO emissions?

       (a) (b) (c) (d)

33. Exhaust temperatures are hottest if:

    a. timing is advanced more than specs.
    b. set right on specs.
    c. retarded more than specs.

34. PCV valves are used to:

    a. control HC emissions.
    b. ventilate the crankcase.
    c. both of the above.
    d. none of the above.

35. Idle CO reading too high indicate:

    a. mixture too lean.
    b. mixture too rich.
    c. timing too advanced.
    d. a and c.

36. No distributor vacuum advance at 2500 RPM would:

    a. tend to lower HC readings.
    b. tend to raise HC readings.
    c. probably not be noticeable on HC scale.

37. HC readings are highest on:

    a. acceleration.
    b. deceleration.
    c. approximately the same in a or b

38. NO_x emissions are reduced by:

    a. evaporative control systems.
    b. carbon canisters.
    c. EGR control systems.

39. Crankcase fumes are 100% controlled by:

    a. open PCV systems.
    b. closed PCV systems.
    c. road draft tube.

40. A.I.R. control, thermal reactor and catalytic converter systems all reduce HC and CO after the exhaust leaves the engine cylinder.

    a. true
    b. false

41. A cracked intake manifold causing an air leak would tend to:

    a. lower HC readings.
    b. raise CO readings.
    c. raise HC readings.
    d. both a and b.

42. 2500 RPM CO readings too high indicate:

    a. mixture too rich.
    b. timing too advanced.
    c. both a and b
    d. none of the above.

43. If the HC and CO read too high at idle but OK at 2500 RPM:

    a. the initial timing is retarded too much.
    b. the initial timing is set too far advanced.
    c. the idle mixture screws are set too rich.
    d. both b and c

44. The fuel vapors stored in a carbon canister:

    a. are returned to the gas tank when the engine is started.
    b. are burned in the engine when it is started.
    c. stored in canister until saturated and then replaced.

45. On an engine that is normally denied vacuum advance at idle you discover full manifold vacuum at the advance unit. With this condition you would:

    a. see higher HC readings than normal.
    b. see higher CO readings than normal.
    c. see lower HC readings than normal.
    d. both a and b.

46. When an engine misfires you would expect:

    a. to see very high CO and HC readings.
    b. to see only very high CO readings.
    c. to see only very high HC readings.
    d. no appreciable change in either reading.

47. Air leaks in the muffler or tail pipe will:

    a. make idle HC-CO read lower than it should.
    b. make idle HC-CO read higher than it should.
    c. affect only HC reading.
    d. affect only CO reading.

48. When adjusting idle mixtures leaner, you may lower CO too much and see:

    a. CO start climbing higher again.
    b. HC start climbing higher again.
    c. both a and b.
    d. none of the above.

49. If the power circuit is "open" when you test at 2500 RPM the CO readings will be:

    a. not shown on CO meter.
    b. lower than normal.
    c. higher than normal.

50. What causes photochemical smog:

    a. unburned hydrocarbons and oxides of nitrogen mixed with vapor and air.
    b. unburned hydrocarbons and oxides of nitrogen mixed with air in the presence of sunlight.
    c. smoke and fog.

51. On a dual diaphragm vacuum advance unit the diaphragm chamber closest to the distributor housing must have:

    a. vacuum only at wide open throttle.
    b. vacuum only during deceleration.
    c. vacuum only when transmission switch is closed.
    d. full vacuum at idle.

52. Although vacuum controlled, the early fuel evaporative valve works similar to the ________________.

a. heat riser.
b. EGR valve.
c. staged choke pull off.
d. idle speed solenoid.

53. A customer has a 1974 vehicle and says that when the engine is cold it runs rough between 10 and 30 MPH. The condition goes away after the engine warms up. Carburetion and ignition check out O.K. The problem could be:

a. a vacuum leak.
b. an EGR valve stuck open.
c. a defective EGR-CTO (temperature control valve) valve.
d. a defective charcoal canister purge valve.

54. When would the EGR valve be in operation?

a. when the engine is at normal temperature and 2,000 RPM.
b. when the engine is at normal temperature and at idle.
c. when the engine is cold and at 2,000 RPM.
d. when the engine is cold and the transmission is in 1st or 2nd gear.

55. A vehicle is at normal operating temperature and equipped with a vacuum type heated air system (TAC). When you check the vacuum at the vacuum motor it reads 5 in. Hg. This reading would indicate:

a. a faulty sensor.
b. a restricted vacuum hose.
c. a ruptured diaphragm in vacuum motor.
d. no problem normal operation.

56. The speed controlled spark system serves the same purpose as the transmission controlled spark. However, unlike the TCS system vacuum advance is controlled through regulation of the ground circuit by the:

a. transmission switch.
b. speed sensor and amplifier.
c. temperature switch.
d. vacuum control valve.

57. An engine idles "rough" and has low manifold vacuum. However, above R.P.M. the condition "smooths out". All vacuum hoses are O.K. and connected properly. The first thing that should be done is:

a. take a compression test.
b. replace air filter element.
c. remove and check EGR valve.
d. check PCV valve.

58. The fuel evaporative system consists of four (4) major components:

    a. fuel tank, pressure-vacuum fuel tank cap, liquid vapor separator, diverter valve.
    b. pressure-vacuum fuel tank cap, vapor canister, liquid vapor separator, fuel tank.
    c. liquid vapor separator, thermal relief valve, fuel tank, vapor canister.
    d. fuel pump, carburetor, fuel tank, pressure vacuum fuel tank cap.

59. The transmission controlled spark system is used to help reduce exhaust emissions by:

    a. advancing the spark with the transmission in low gear.
    b. providing a hotter spark with the transmission in high gear.
    c. denial of vacuum advance with the transmission in lower gears and the engine at operating temperature.

60. A customer complains he replaced the diverter valve (by-pass valve) twice within 5,000 miles and needs replacing again. Upon inspecting the diverter valve you discover exhaust residue inside. A probable cause is:

    a. wrong type of vacuum applied to trigger the valve.
    b. a faulty check valve.
    c. low output from air pump.
    d. a faulty relief valve.

61. The speed sensor in a spark control system is used to:

    a. ground the circuit for the tach.
    b. control electrical circuit through the solenoid vacuum control valve.
    c. energize buzzer for over speeding.
    d. prevents premature upshift of transmission.

62. On most vehicles equipped with an automatic transmission and transmission controlled spark (TCS), you can check operation of the TCS system by putting the transmission in:

    a. park.
    b. reverse.
    c. neutral.
    d. any drive range.

63. The air pump introduces fresh air into the _______________ to reduce hydrocarbon and carbon monoxide emissions:

    a. engine exhaust system.
    b. intake ports.
    c. EGR
    d. TCS

64. On a vehicle with a heated air intake system, the air door should be in the _______________ at idle with a cold engine.

    a. hot air delivery mode.
    b. cold air delivery mode.
    c. regulating mode.

65. Back-fire upon deceleration could indicate:

    a. faulty check valves.
    b. faulty air pump.
    c. air pump belt slipping.
    d. faulty diverter valve.

66. A defective (stuck open) E.G.R. valve will be indicated by:

    a. hard starting.
    b. rough idle.
    c. high speed miss.
    d. high NO_x emissions.

67. To check the speed controlled spark (SCS) system a mechanic must do which of the following:

    a. raise the rear wheels.
    b. shift to DRIVE.
    c. note engine timing when advancing speed from below 15 MPH to 45 MPH.

68. The AIR system supplies fresh air to the exhaust gases except during:

    a. acceleration.
    b. idle.
    c. wide open throttle.
    d. deceleration.

69. The TCS system includes a thermal vacuum hot override switch whose function is:

    a. to allow advance in high gear only.
    b. to allow vacuum advance at idle.
    c. to allow for better drivability during cold operation.
    d. to recover coolant during boilover.

70. You are diagnosing a six (6) cylinder engine with only an HC-CO analyzer. The CO reading at idle is 2.4%. You disconnect one spark plug wire at a time and take a CO reading. Wire is reconnected after each analyzer reading. CO reading with:

    a. No. 1 disconnected = 2.2%
    b. No. 2 disconnected = 2.2%
    c. No. 3 disconnected = 2.0%
    d. No. 4 disconnected = 2.4%
    e. No. 5 disconnected = 2.1%
    f. No. 6 disconnected = 2.3%

71. Same conditions as in Question number 70.

Which cylinder is receiving the leanest air-fuel mixture?

a. #2
b. #5
c. #6
d. #3

72. Same conditions as in Question number 70.

From the CO readings which cylinder would you expect to be misfiring?

a. #3
b. #4
c. #5
d. #1

73. A component of the fuel evaporative emission control system that prevents liquid fuel from entering the vapor line to the canister.

a. EGR valve.
b. diverter valve.
c. separator liquid/vapor
d. PCV valve.

74. Regulates the amount of crankcase gases flowing from the engine crankcase to the carburetor as determined by intake manifold vacuum:

a. diverter valve.
b. PCV valve.
c. EGR valve.
d. thermal vacuum valve.

75. Most EGR valves begin to open when ________ inch(es) of vacuum is applied to the valve diaphragm.

a. 1
b. 4
c. 7
d. 10

76. One type of fuel evaporation control systems used on late model cars is the:

a. non-vented fuel tank cap.
b. vented fuel tank cap.
c. hydrocarbon tank cap.
d. all of the above.

77. Which statement is NOT correct in reference to a leaking exhaust system?

   a. the muffler is a filter; therefore, a leak behind the muffler is dangerous.
   b. breathing exhaust fumes will damage the brain.
   c. sometimes one may not smell exhaust until it is too late.
   d. a vehicle must not have any holes in the floor pan since exhaust fumes could get through.

78. Lean air/fuel mixtures are difficult to ignite. They can be made to ignite easier by increasing the:

   a. engine speed.
   b. compression ratios.
   c. charge temperature.
   d. volumetric efficiency.

79. Which of the following usually accompanies photochemical smog?

   a. lung damage.
   b. eye irritation.
   c. severe headache.
   d. skin rash.

80. What is the major reason for REDUCING the lead content of gasoline?

   a. to reduce hydrocarbon emission.
   b. to lower the fuel cost.
   c. to prevent catalyst contamination.
   d. to minimize engine deposits.

81. The primary reason for adding preheated air to an engine exhaust manifold is to:

   a. improve engine starting.
   b. minimize carburetor icing.
   c. reduce harmful emissions.
   d. prevent engine freezing at very low temperatures.

82. Hydrocarbon emissions result from:

   a. lean mixture.
   b. high combustion temperature.
   c. engine misfiring.
   d. gasoline additives.

83. When are evaporation emissions the most serious problem?

   a. when the vehicle is hot and running at high speeds.
   b. when the engine is cut off with a hot soak situation involved.
   c. during sudden acceleration.
   d. when high octane fuel is used.

84. Two types of positive crankcase ventilation systems are the closed type and the:

    a. air flow cleaner type.
    b. air injector type.
    c. backfiring type.
    d. open type.

85. A typical air injector system is:

    a. the thermactor.
    b. the ventilation.
    c. the pressurized.
    d. the rotor.

86. Which of the following is NOT an emission producing area?

    a. engine crankcase.
    b. exhaust.
    c. carburetor.
    d. gasoline tank.
    e. cooling system.

87. Which of the following locations for replacing PCV valve is correct?

    a. in the inlet pipe.
    b. under the valve covers.
    c. between the intake manifold and the crankcase emission outlet.
    d. between the carburetor and the oil filler cap.

88. If the combustion analyser reads 14 to 1, which of the following is being checked?

    a. compression ratio.
    b. piston displacement.
    c. air-fuel mixture.
    d. cylinder volume.

89. The positive crankcase ventilation system removes all pollutants from engine oil EXCEPT which of the following?

    a. water vapor.
    b. blow-by gases.
    c. acid.
    d. gasoline vapor.
    e. oil fumes.

90. Which of the following functions BEST describes the exhaust emission control?

    a. it forces air to the exhaust parts.
    b. it pumps fresh air through the air cleaner.
    c. it pumps unburned gases back to the tank.
    d. it reduces heat in the exhaust manifold.

91. Which of the following emission systems is related to GM products?

    a. C.A.P. system.
    b. I.M.C.O. system.
    c. A.I.R. system.

92. Which of the following exhaust gases is NOT deadly, but causes the eyes to smart?

    a. carbon dioxide and water.
    b. carbon monoxide.
    c. hydrocarbons.
    d. nitrogen oxides.

TEST ITEM POOL ANSWERS

DOMAIN I: Heating and Cooling Systems

Test Item Pool Answer Sheet

1. D
2. C
3. D
4. E
5. D
6. A
7. A
8. B
9. A
10. A
11. B
12. D
13. D
14. E
15. D
16. B
17. D
18. C
19. A
20. (See Test)
21. (See Test)
22. (See Test)
23. (See Test)
24. (See Test)
25. (See Test)
26. C
27. A
28. B
29. B
30. B
31. C
32. C
33. D
34. C
35. C
36. C
37. F
38. C
39. D
40. D
41. E
42. C
43. B
44. A
45. B
46. A
47. D
48. B
49. B
50. D
51. B
52. C
53. A
54. B
55. D
56. A
57. D
58. A
59. A
60. C
61. C
62. B
63. C
64. B
65. C
66. C
67. D

DOMAIN II: Fuel Systems

Test Item Pool Answer Sheet

1. A
2. B
3. C
4. A
5. B
6. E
7. C
8. D
9. C
10. A
11. B
12. A
13. E
14. A
15. E
16. A
17. C
18. A
19. D
20. A
21. C
22. C
23. B
24. D
25. D
26. B
27. B
28. D
29. E
30. A
31. A
32. B
33. B
34. B
35. B
36. A
37. B
38. B
39. D
40. D
41. B
42. C
43. B
44. D
45. C
46. D
47. A
48. A
49. B
50. B
51. A
52. B
53. D
54. C
55. B
56. B
57. A
58. D
59. D
60. A
61. C
62. A
63. A
64. C
65. C
66. A
67. D
68. D
69. A
70. B
71. A
72. A
73. B
74. B
75. C
76. C
77. B

DOMAIN III: Body Electrical

Test Item Pool Answer Sheet

1. B
2. E
3. C
4. B
5. C
6. B
7. D
8. E
9. D
10. D
11. A
12. D
13. D
14. C
15. D
16. C
17. B
18. B
19. D
20. D
21. C
22. D
23. A
24. C
25. D
26. D

DOMAIN IV: Braking System

Test Item Pool Answer Sheet

1. E
2. B
3. E
4. C
5. C
6. C
7. A
8. E
9. B
10. A
11. B
12. B
13. D
14. C
15. C
16. A
17. A
18. B
19. D
20. B
21. D
22. B
23. D
24. A
25. B
26. B
27. B
28. C
29. A
30. C
31. D
32. A
33. D
34. B
35. B
36. B
37. B
38. C
39. C
40. A
41. D
42. D
43. D
44. A
45. C
46. B
47. D
48. B
49. B
50. B
51. D
52. B
53. B
54. C
55. D
56. C
57. C
58. A
59. B
60. C
61. D
62. D
63. A
64. B
65. C
66. D
67. B
68. B
69. A

DOMAIN V: Engine Systems

Test Item Pool Answer Sheet

1. B
2. A
3. C
4. A
5. D
6. E
7. A
8. B
9. C
10. A
11. D
12. A
13. E
14. B
15. A
16. C
17. E
18. B
19. A
20. A
21. E
22. C
23. D
24. B
25. C
26. C
27. E
28. A
29. B
30. C
31. B
32. C
33. E
34. C
35. B
36. E
37. B
38. D
39. D
40. D
41. C
42. B
43. D
44. A
45. C
46. B
47. A
48. D
49. B
50. B
51. B
52. D
53. B
54. B
55. D
56. D
57. C
58. D
59. A
60. D
61. D
62. C
63. A
64. D
65. B
66. B
67. C
68. D
69. B
70. C
71. A
72. A
73. B
74. B
75. A
76. C
77. B
78. D
79. B
80. D
81. A
82. B
83. A
84. D
85. C
86. C
87. B
88. D
89. A
90. C
91. C
92. D
93. A
94. D
95. B
96. D
97. B
98. B
99. B
100. A
101. A
102. D
103. A
104. D
105. C
106. D
107. D
108. D
109. B
110. A
111. B
112. C
113. B
114. D
115. A
116. C
117. B
118. C
119. C
120. D
121. D
122. B
123. D
124. B
125. D
126. A
127. C
128. A
129. A
130. D
131. C
132. D
133. A
134. A
135. B
136. B
137. C
138. A
139. E
140. C
141. C
142. C
143. A
144. A
145. D
146. D
147. A
148. A
149. C

DOMAIN VI: Power Train Domain

Test Item Pool Answer Sheet

1. C
2. A
3. C
4. E
5. C
6. C
7. C
8. A
9. D
10. B
11. D
12. C
13. D
14. B
15. A
16. A
17. A
18. B
19. D
20. C
21. C
22. D
23. D
24. B
25. C
26. D
27. B
28. C
29. D
30. B
31. C
32. C
33. B
34. C
35. B
36. B
37. A
38. D
39. D
40. D
41. B
42. B
43. C
44. C
45. A
46. C
47. B
48. B
49. B
50. C
51. A
52. C
53. C
54. B
55. A
56. C
57. E
58. B
59. D
60. B
61. A
62. A
63. A
64. B
65. A
66. C
67. A
68. A
69. C
70. A
71. C
72. E
73. A
74. D
75. B
76. E
77. E
78. D
79. E
80. C
81. D
82. D
83. E
84. B
85. A
86. A
87. C
88. A
89. E
90. A
91. B
92. A
93. D
94. A
95. C
96. D
97. A
98. C
99. B
100. A
101. B
102. A
103. A
104. E
105. A
106. D
107. B
108. C
109. B
110. C
111. D
112. C
113. D
114. D
115. B

DOMAIN VII: Starting and Charging Systems

Test Item Pool Answer Sheet

1. C
2. B
3. A
4. B
5. C
6. E
7. C
8. A
9. A
10. D
11. C
12. E
13. C
14. C
15. C
16. C
17. D
18. E
19. D
20. C
21. A
22. C
23. D
24. A
25. D
26. D
27. C
28. A
29. C
30. C
31. D
32. D
33. C
34. A
35. B
36. D
37. A
38. B
39. B

DOMAIN VIII: Ignition System

Test Item Pool Answer Sheet

1. A
2. B
3. E
4. B
5. C
6. A
7. B
8. D
9. C
10. D
11. C
12. D
13. B
14. D
15. A
16. B
17. D
18. D
19. D
20. C
21. D
22. B
23. C
24. B
25. B
26. D
27. D
28. C
29. C
30. D
31. C
32. C
33. B
34. B
35. D
36. D
37. B
38. C
39. B
40. B
41. C
42. D
43. C
44. B
45. D
46. A
47. D
48. D
49. E
50. B
51. C
52. B
53. A
54. A
55. C
56. D
57. B
58. A
59. D
60. D
61. B
62. A
63. A
64. C
65. E
66. D
67. A
68. B
69. A
70. C
71. B
72. A
73. C
74. D
75. E
76. B
77. A
78. C
79. E
80. C
81. A
82. A
83. E
84. D
85. C
86. A
87. D
88. A

DOMAIN IX: Suspension and Steering Systems

Test Item Pool Answer Sheet

1. B
2. B
3. A
4. A
5. E
6. B
7. C
8. E
9. B
10. A
11. B
12. C
13. D
14. E
15. C
16. D
17. C
18. D
19. B
20. C
21. A
22. A
23. A
24. A
25. B
26. B
27. D
28. C
29. C
30. C
31. A
32. D
33. A
34. B
35. C
36. C
37. D
38. A
39. D
40. A
41. C
42. B
43. D
44. D
45. A
46. C
47. A
48. E
49. A
50. D
51. C
52. C
53. B
54. D
55. A
56. B
57. C
58. C
59. D
60. C
61. A
62. C
63. B
64. D
65. B
66. C
67. B
68. A
69. D
70. C
71. B
72. A
73. D
74. E
75. E
76. B
77. A
78. B
79. D
80. D
81. A
82. B

DOMAIN X: Emissions Control

Test Item Pool Answer Sheet

1. C
2. C
3. C
4. D
5. C
6. A
7. C
8. C
9. A
10. B
11. C
12. A
13. B
14. C
15. B
16. A
17. B
18. C
19. C
20. C
21. C
22. B
23. A
24. B
25. B
26. C
27. D
28. C
29. A
30. D
31. A
32. C
33. C
34. C
35. B
36. A
37. B
38. C
39. B
40. A
41. C
42. A
43. C
44. B
45. A
46. C
47. A
48. B
49. C
50. B
51. D
52. A
53. C
54. A
55. D
56. B
57. D
58. B
59. C
60. B
61. B
62. B
63. A
64. A
65. D
66. B
67. D
68. B
69. B
70. A
71. C
72. B
73. C
74. B
75. B
76. A
77. C
78. D
79. A
80. A
81. A
82. C
83. B
84. D
85. A
86. B
87. C
88. C
89. C
90. B
91. C
92. D

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